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Vol. XLV

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FLIGHT

and The AIRCRAFT ENGINEER

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

APRIL 13th, 1944

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FLIGHT and The AIRCRAFT ENGINEER

First Aeronautical Weekly in the World : Founded 1909

Editor C. M. POULSEN

Managing Editor G. GEOFFREY SMITH, M.B.E.

Chief Photographer JOHN YOXALL

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The Outlook

Putting the Jet on the M.A.P.

WHEN it was announced, some years ago, that the Ministry of Aircraft Production had taken over Short Brothers, "lock, stock and barrel," we expressed grave misgivings concerning the precedent thus established. It seemed to us then, and it seems so to us now, that something a little less drastic might have met the case. We hope, and prefer to believe, that a very different motive was behind the recently announced taking-over by M.A.P. of Power Jets, Ltd., the firm which has been so closely concerned in the pioneering work of developing the Whittle jet-propulsion power plants, an early model of which was installed in the Gloster monoplane designed for it by Mr. George Carter.

Much progress has been made since those early days, both here and in the United States. But more remains to be done before the jet principle can be said to have reached maturity. After all, jet engines should be regarded as being at this time in just about the same stage of development as was the four-cylinder reciprocating engine of the Wright brothers in 1908 or so. If one thinks of that engine, developing something under 30 h.p., and weighing seven or eight pounds per horse-power, and compares it with, for example, the Rolls-Royce Merlin, which is now approaching 2,000 h.p. for a specific weight of somewhere in the neighbourhood of 1 lb. per h.p., the jet engine parallel becomes extremely interesting.

The assumption is that the Ministry of Aircraft Production regards the jet rather in this light and has decided that the development of a new prime mover with such vast potentialities should not, if this country is to hold her rightful place in a sphere in which she took the lead, be left to the limited resources of a relatively small private concern. This in no way reflects adversely on the past history of Power Jets, Ltd., which, in fact, has been very praiseworthy. It merely means, or so we suppose and hope, that from now onwards the whole nation, via M.A.P., is behind the undertaking. With such resources progress should be rapid and the day of jet-propelled aircraft for peace as well as war brought much nearer.

The Satellite Capitals

BRITISH and American bomber crews are always instructed to take meticulous care to confine their attentions to military objectives. Nevertheless, it often happens that a raid on legitimate targets in a city has a psychological effect on the will to fight of the Government and people of the country in which the city lies. That effect is often particularly marked in small countries where the capital is by far the most important city.

It will be remembered that so soon as the Finns showed definite signs of wavering in their alliance with Germany the Russians promptly made several air raids on Helsinki, and they seem to have had a very stimulating effect in urging the Finnish Government towards the opening of negotiations for peace.

Bulgaria always had a warmer feeling for the Russians than she had for the Germans, and as the Red Armies advanced her enthusiasm for the war grew markedly less. The Allies in the Mediterranean seized the moment for making a series of raids on Sofia, and the consternation which they caused has been described as almost ludicrous. Bulgaria is not yet beaten to her knees, but her fighting morale has been distinctly shaken.

Next came the case of Hungary and Rumania. Both were obviously wavering in their allegiance to Hitler, and the peremptory manner in which he sent German

troops to occupy both countries roused resentment. That created an opportunity for the Allies to push both countries a little farther over the edge of the abyss on which they were precariously perched. On April 3rd General Twining sent a force of Fortresses and Liberators to bomb the railway yards of Budapest, and that night Wellingtons and Liberators attacked the steelworks and armament factory on the Danube just below the city.

In the meantime the troops of Marshal Koniev had crossed the river Pruth and begun the invasion of Rumania, and further air action was obviously indicated. Again the 15th Air Force of General Twining was chosen to open the ball, and on April 4th it went for the railway yards in Bucharest. In both capitals the railways are important points in the German supply system to the Balkans, and are perfectly legitimate targets. It remains to be seen, however, whether the psychological effect of these attacks will not be even greater than the material damage done.

The Barracuda's Bow

THE Fairey Barracuda torpedo-bomber, so long discussed in whispers in Fleet Air Arm circles, has at last come into the open, and in a very dramatic way. It was the type chosen to strike at the *Tirpitz* at the very moment when she was about to leave her anchorage in Alten Fjord to steam away to some naval base where she could once more be put into fighting trim.

The operation must have been one of exceptional difficulty. After the attack by the midget submarines, the Germans would certainly have taken all precautions to prevent another use of torpedoes. As the battleship was about to steam away on April 3rd, the nets might have been removed; but this could not have been foreseen. In any case it would be difficult to launch air torpedoes in a narrow fjord with high mountains all round. Bombing, too, presented difficulties, for the cliffs above were said to slope in such a way as to shelter the vessel from high-level bombing. Moreover, her deck would naturally be armour-plated, as are the decks of all modern battleships.

These circumstances suggest that some special form of bomb may have been used, and the possibility cannot be ruled out that among them may have been some glider-bombs. This contingency is not contradicted by the statement that hits were obtained on various spots; while the fact that the ship was set on fire amidships also suggests that some means had been found of circumventing the protection of the armoured deck. The object of the attack must have been to hit the *Tirpitz* as near to the water line as possible, and so prevent her from steaming away. Her armament did not count, as it would in a fleet action; the object was to cripple her power of movement. It is much to be hoped that this object has been achieved. If so, it is yet another great score by the Fleet Air Arm

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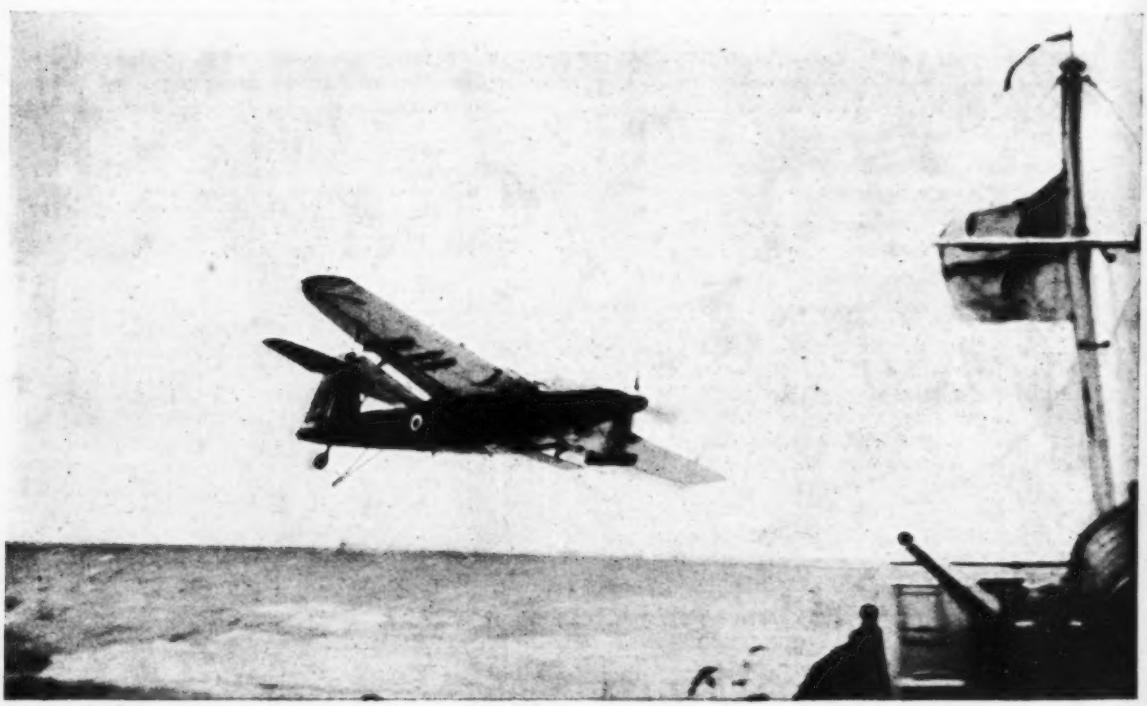


NAVAL DIVE-TORPEDO-BOMBER: A Fairey Barracuda, with arrester hook down, passes over the stern of the attendant destroyer as it comes in to land on its carrier. The attack on the *Tirpitz* in Alten Fjord was the first official announcement of the Barracuda in action. Other photographs on page 385.

AMPHIBIOUS OPERATION: Retrieving boxes of tools on a flooded airfield in the Mediterranean area. Halifax II, IA's and Thunderbolts of the N.A.A.F. use the airfield.

WAR in the AIR

Great Nuremberg Air Fight : Satellite Capitals Bombed : The "Tirpitz" Attacked Again : General Wingate Killed

THE loss of 94 bombers in an attack by Lancasters and Halifaxes on Nuremberg on the night of March 29th-30th, has proved that the fighter branch of the *Luftwaffe* is still full of fight when the object is deemed worthy of an effort. The R.A.F. took a risk in attacking in bright moonlight. Several other attacks have been made recently in similar conditions, and with sufficient success to warrant perseverance in the policy. On this occasion, however, the bright light favoured the defence. Our air gunners must have scored some successes too, but officially only one enemy aircraft has been claimed as destroyed that night. In the hurly-burly of a desperately hard fight there would be few chances to keep tally of the results of attacks. Moreover, it is reasonable to suppose that many of the missing bombers left their mark on their attackers; but the crews did not return to make their claims.

We grieve for our losses; but to think only of R.A.F. losses because they are published day by day is to lose a sense of proportion. There must be many days on which the Armies in Italy lose more lives than are sacrificed in an ordinary R.A.F. raid, but we do not get the casualty lists published day by day, and so are not affected by them in the same way.

Another piece of bad news is the death of Major Gen. Wingate in an

SINGED: A sooty and charred Mosquito night-fighter which ventured too close to a Ju 188 before opening fire. There was a great explosion and sheets of blazing oil smothered the Mosquito, covering the windscreen with soot and burning the fabric off the wings, fuselage and rudder.

WAR IN THE AIR

air crash in Burma. His loss will be deeply felt, for he was a soldier of an original turn of mind, belonging perhaps to the same class as Col. T. E. Lawrence, though one was a professional soldier and the other held a temporary commission. Flying over the mountains of Burma, especially when they are wreathed in clouds, is always a hazardous proceeding; and on the whole our losses of aircraft during the present campaign there have been surprisingly light. That makes it all the more deplorable that one such crash should have carried off the man who could least be spared. The General was returning from an inspection of some of his troops, and so was probably unable to avail himself of the meteorological forecasts which have simplified the tasks of the air crews who started off from base.

Round Imphal, the chief city of Manipur State, and the principal Allied base in Burma, fear was felt for a time that the Japanese might advance into the plain and capture our airfields. So ground crews, clerks, and other airmen had to man the defence posts, while the detachments of the R.A.F. Regiment took up defensive positions on the hill tops round about. The men of the R.A.F. Regiment are, like the Royal Marines, primarily soldiers, and doubtless they have been put through a thorough course of military training before being passed as fit to hold such important positions.

Extension of Air Action

MORE cheerful news comes from the Pacific, where the U.S. Pacific Fleet, of course including aircraft carriers, has attacked the Palau group of islands to the west of the Carolines. This is one step nearer to the lost Philippines, and another challenge to the Japanese battle fleet to come out and fight for its country's conquests. That fleet has disappeared, and if the Japanese war lords have decided that it must be kept intact for the defence of the homeland, then there is nothing except the vast distances to prevent the Americans from cutting off all the Japanese troops in the occupied islands from their bases. A good deal has been done in that way already, and it has been calculated that some 100,000 Japanese soldiers in the besieged islands of the south and south-west Pacific are now in a hopeless position, doomed either to destruction in battle or to death from starvation and disease. How bereft of strategic sense were the Japanese when they attacked Pearl Harbour and did not foresee the possibility of the present outcome!

The Russian crossing of the river Pruth into Rumanian territory was promptly followed by bombardments from the air of the Capitals of Hungary and Rumania. At Budapest the U.S. 15th Air Force struck at the railway yards by day, while on the following night the R.A.F. bombed a factory just outside the city. The only force of night-bombers which the Allies keep in the Mediterranean consists of Wellingtons, and it was evidently felt that it would be a good thing to send something heavier as well. The Americans are not trained in night-bombing work, so some of their Liberators were borrowed by the R.A.F. and manned by crews familiar with that sort of work, and they accompanied the Wellingtons. The factory chosen as the target lies on the Danube outside the city, and so the chance of doing widespread damage to civilians was slight. The railway yards lie in the centre of the city, and for that reason it was preferable when attacking them to use the precision methods of the American day-bombers.

Next day Bucharest had its turn, and again the Americans bombed the railway yards by day. No doubt Russian bombers could have reached the city, but for one thing most of the Russian bombers must be fully occupied in helping in the land battles, and for another they have not been highly trained in the sort of bombing required. It is not known whether there was an agreement between the Russians and the Anglo-Americans in the Mediterranean, but in any case the American methods were obviously most suitable to the task. The news of the raid must have cheered up the Russian soldiers, already flushed with victory as they were.

The railway yards in both Budapest and Bucharest are important points on the German lines for supplying the Balkan front, but bomb damage to railways is usually easy to repair, and the Germans are experts at repair work. We cannot hope that these raids will hold them up for long; but the moral effect of the blows may well be great.

The "Tirpitz" Hit Again

TALKING of repair work, it seems that the Germans had succeeded in making good much of the damage done some time ago to the battleship *Tirpitz* by the British midget submarines. There would be no possibility of getting her fit to fight in the remote Norwegian fjord where she is lying, and the German object must be to patch her up sufficiently to move her to a fully equipped naval base. The reconnaissance aircraft of Coastal Command must have been watching the progress of the work and keeping the Admiralty informed. The latter decided that the time had come to throw another spanner into the works,

PRE-TIFFY : The Hawker Tornado, a forerunner of the Typhoon, was powered by a Rolls-Royce Vulture V, 24-cylinder, X-type engine of 2,060 h.p. The only other aircraft to have the Vulture engine was the Avro Manchester. Further photographs of the Tornado appear on page 391.

ENEMY AIR LOSSES TO APRIL 1st

	Over G.B.	Over Con't.	Middle East	Italy
Mar. 26	0	3	0	7
,, 27	11	0	0	0
,, 28	0	0	0	16
,, 29	0	1	0	22
,, 30	0	1	0	15
,, 31	0	0	0	4
Apr. 1	0	0	0	0
	11	5	0	64

Totals : West, 8,135 ; Middle East, over 5,845 ; N.W. Africa and Italy, 4,916.

and so on April 3rd naval aircraft made an attack and are reported to have scored several hits with bombs. This feat, it is to be hoped, will prevent the *Tirpitz* from making any more attempts to go out raiding on Allied convoy routes, and she may survive to be surrendered when the Armistice comes. But what a difference the German fleet will present to the imposing array of battleships and cruisers which gave themselves up to

WAR IN THE AIR

Beatty in 1918! That most of those ships were scuttled did not matter much ; they provided useful salvage.

The attack on the *Tirpitz* introduced the Fairey Barracuda to the public. Actually the type has been in service with the Fleet Air Arm for about a year, and the number of squadrons equipped with it has been steadily increased. The Admiralty statement showed that two forces of Barracudas were flown off the carriers, and they were supported by a strong body of naval fighters. No enemy fighters were met, but there was *flak* from the ship and from ground batteries. By the time the attack was over the fire from the ship had been silenced, no doubt by the medium bombs dropped. The main defence was a smoke screen, but this did not protect the battleship, and the later attacks scored hits. The loss

BRITISH & U.S. AIR LOSSES TO APRIL 1st

	Over G.B. A'cft.	Continent B'brs.	Continent F'trs.	Middle East A'cft.	Italy A'cft.
Mar. 26	0	15	2	0	5
,, 27	0	6	10	0	3
,, 28	0	5	3	0	10
,, 29	0	11	9	0	11
,, 30	0	96	3	0	12
,, 31	0	0	1	1	2
Apr. 1	0	12	4	0	2
	0	145	32	1	45

Totals : West, 10,921 ; Middle East, about 2,388 ; N.W. Africa and Italy, 1,911.

of three Barracudas and one fighter (whose pilot is safe) was a very moderate price to pay, especially if the damage done was as effective as is hoped.

Ploesti has again been bombed by American heavy bombers from the Mediterranean. The chief targets were the railway yards and an adjacent refinery. The wells themselves do not make easy targets, and refineries are much more vulnerable.

THE NAVY'S NEWEST : The Fairey Barracuda (Rolls-Royce Merlin engine) is built to a most difficult specification to meet the requirements of the Fleet Air Arm. It had to be equally suitable for dive, precision and torpedo bombing ; to be reasonably fast and yet take off and land on a carrier's deck ; wings had to fold to enable it to go below on the lift ; pilot and crew had to have a good view. This latter consideration is presumably the reason for the high-wing arrangement which, in its turn, necessitates the high position of the tailplane to give good control in the dive. No official release of information has yet been made, but from external appearances it may be assumed that the diving brakes-cum lift flaps are of the Youngman type.

HERE AND THERE

To be Second in Command

AIR VICE-MARSHAL T. W. WILLIAMS, a South African, has been appointed second in command to Major General George Stratemeyer in the Eastern Air Command. He was formerly Senior British Air Staff Officer in India.

Decorated by General Arnold

AIR MARSHAL SIR WILLIAM WELSH, head of the R.A.F. delegation to the U.S., has been presented with the Legion of Merit by Gen. H. H. Arnold, Chief of the U.S.A.A.F.

U.S. Aid to U.S.S.R.

AMONG the vast amount of material supplied to Russia by America under Lend-lease are a total of 8,800 aircraft. Of these some 4,000 have been flown there, probably many of them by the Arctic route via Alaska to Siberia across the Behring Strait, a sea crossing of only 50 miles.

New Long-range Fighters

A REUTER message from Washington reports Maj. Gen. Oliver P. Echols, Chief of the U.S.A.A.F. Material Command, as saying that American designers are hard at work on new long-range fighter aircraft, and that it is believed these are intended primarily as escort fighters for the B-29 Super-Forts.

World Air Tour

LORD KNOLLYS, chairman of B.O.A.C., recently completed a 35,000 miles' air tour in 60 days when he flew back to Britain from Montreal by the Return Ferry Service.

During his world air tour Lord Knollys inspected airway routes and stations in Egypt, the Middle East, India, Australia and New Zealand.

Brig. Gen. A. C. Critchley, Director-General of B.O.A.C., also returned from a visit to air stations in West Africa.

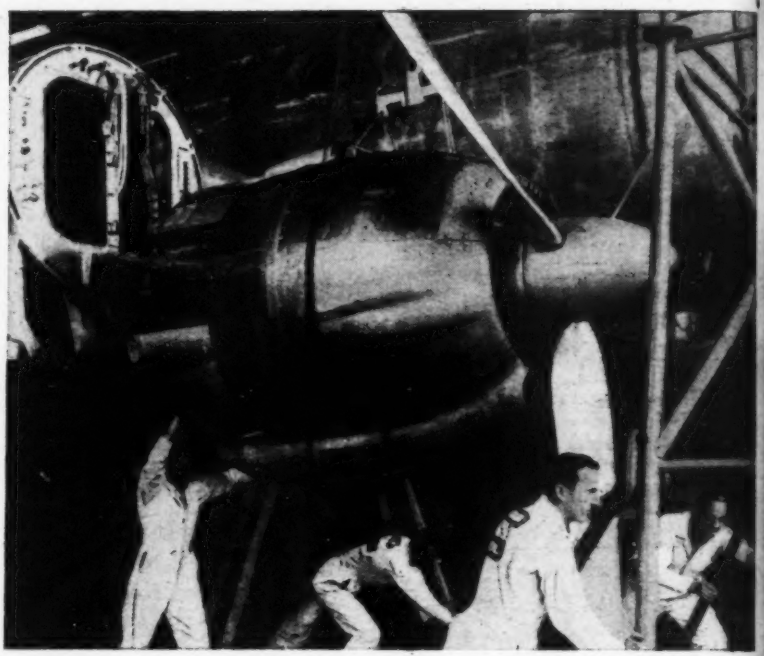
Big Job

MAJ. GEN. HENRY J. F. MILLER, of Miami, who served in England in 1918 as an observer, and has been in this country since early in 1942, is now in command of the 9th Air Force Service Command. This is the biggest command in the "Ninth," and is, of course, responsible for the whole of the supply and maintenance of its aircraft and equipment.

West-East Atlantic Record

A TRANSPORT Lancaster established a record for a non-stop westbound flight from Britain to Montreal last month, the pilot being Capt. R. M. Smith, of T.C.A., and the navigator F/O. H. Thomas.

The elapsed time to fly the 3,140 statute miles from take-off in Scotland to landing in Montreal was 12 hr. 59 min., bettering by 17 minutes the record established a week before by Capt. A. Rankin, also a T.C.A. pilot. The "Lanc" carried 3,611 lb. of army mail and 425 lb. of freight as well as four official passengers.



POOLED PROGRESS : This picture of a 2,000 h.p. Wright Cyclone "power egg" being fitted to a Lockheed C-69 Constellation is a good example of the mutual advantage of the Anglo-American pooling of technical development. For this method of quick change of engines was evolved in Britain in 1938 to facilitate the interchange of Bristol and Rolls-Royce "power eggs."

Mitchell Trainers

IT has been disclosed by Lt. Gen. B. K. Yount, commanding the U.S.A.A.F. Training Command, that B-25 Mitchells are now being used as advanced training aircraft. Redesignated the AT-24, these Mitchells have some of their operational equipment removed, but are otherwise unchanged.

Mitchell bombers, originally ordered for the Netherlands Air Force, are also being acquired by the R.A.A.F. for operations in the South-West Pacific.

"How is it that you never have anything better to offer than a continual flow of destructive criticism?"

Mid-air Safety Device

A NEW anti-collision radio device has been developed by the American concern, the Square D Co., Detroit, for fitting to commercial aircraft after the war. It takes the form of a special transmitter sending out a carrier warning signal, the frequency of which varies automatically according to the height of aircraft; a special receiver, automatically tuned by changes in altitude, is also carried, and this reacts only to the signals from aircraft flying within a few miles and within 1,000ft. of the same altitude.

Thus any two aircraft approaching within the prescribed distance of each other are automatically warned of the fact, and the risk of collision in bad visibility is virtually eliminated.

"Flight" Post Card Size Photographs

THIS special series of photographs stocked by our Photographic Department now has the following additions to the current list of types available: Taylorcraft Auster, Hawker Typhoon IB Avro Lancaster II, Handley-Page Halifax II, 1a, Miles Martinet, Armstrong-Whitworth Albemarle, Bristol Beaufighter X. One view only of each aircraft is stocked, and the price is 8d. each photograph, or 7s. 6d. if a dozen are ordered.

Fuel Delegation to U.S.

A DELEGATION led by Sir William Brown, permanent secretary to the Ministry of Home Security and formerly secretary to the petroleum division of the Ministry of Fuel and Power, has gone to Washington for technical discussions on

In the mofussil they are different !

'Buses like this, capacious and replete, have been a familiar sight for many years in the great cities of the East. But it is a very different matter upcountry. True, the vast majority of all the hundreds of thousands of country villages throughout the Orient, as elsewhere, are linked by motorbuses, but the vehicles adopted over a quarter century of byway exploitation are the very embodiment of simplicity. Few components and strong ones are what the bazaar buswallah appreciates.

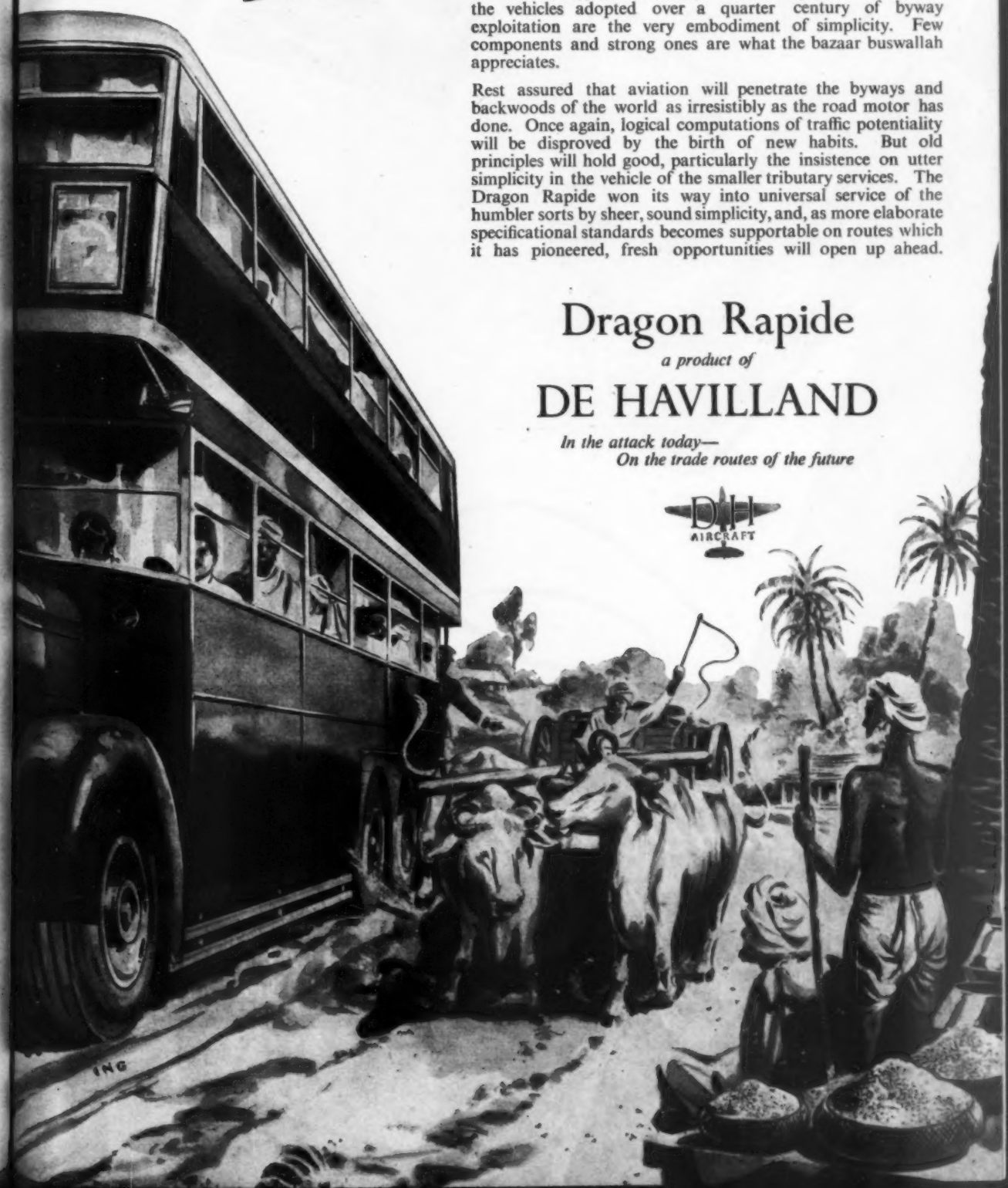
Rest assured that aviation will penetrate the byways and backwoods of the world as irresistibly as the road motor has done. Once again, logical computations of traffic potentiality will be disproved by the birth of new habits. But old principles will hold good, particularly the insistence on utter simplicity in the vehicle of the smaller tributary services. The Dragon Rapide won its way into universal service of the humbler sorts by sheer, sound simplicity, and, as more elaborate specificational standards becomes supportable on routes which it has pioneered, fresh opportunities will open up ahead.

Dragon Rapide

a product of

DE HAVILLAND

In the attack today—
On the trade routes of the future



Newsworthy-Trustworthy

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HERE AND THERE

petroleum questions. Sir Frederick Godber, a member of the Petroleum Board since its inception, and Sir William Frazer, chairman of the Anglo-Persian Oil Coy., are members of the delegation.

Ceylonese School

A NAVAL training establishment where 300 Ceylonese are undergoing instruction in aircraft maintenance and repair has recently been opened in Ceylon, and it is hoped that these men will replace some 70 per cent. of the Fleet Air Arm maintenance ratings in the island for service afloat in aircraft carriers. This school is said to be the first of its kind in a British colony.

Patience Rewarded

AFTER four Catalina flying boats based in Ceylon had spent two days searching 200,000 square miles of the Indian Ocean, one of them located the 42 survivors of a sunken ship hundreds of miles from land.

Much-needed food and drink were dropped near the rafts, but it was not until the fourth day that a tanker was located and directed to the spot to pick them up.

Water–Runway Lights

A NEW type of battery operated hot-cathode fluorescent lamp for illuminating the water area marked out for flying boats alighting at night has been developed in America. Carried in floating rubber "doughnuts," the new lamp reduces the electrical starting "pressure" to only 45 volts, which is one-sixtieth the voltage required by the cold-cathode type previously used.

The light-absorbing properties of water prevent its being efficiently floodlit in the same way as an airfield runway.

Post-war Air Plans

SPECIFIC proposals are contained in a plan for post-war civil aviation which Dr. Adolph A. Berle, U.S. Assistant Secretary of State, is reported to have brought with him when he arrived in London recently with Dr. Edward P. Warner, vice-chairman of C.A.B., to discuss this all-important subject with the British Government. This plan, drawn up by an inter-departmental committee of which Dr. Berle is the head, calls for a limited degree of international control by the United Nations.

One of the main points proposed is the right of American domestic airlines to compete freely on international routes, and it also recommends that the United Nations should establish an authority which would guarantee to U.S. airlines the use of airfields built abroad with lend-lease money.

ALLIED EFFORT: American aircrew helping to bomb-up an R.A.F. Lancaster with a 4,000 lb. block-buster. R.A.F. and U.S.A.A.F. personnel regularly visit each other's airfields to maintain genuine liaison between the two air forces.

Other Schools of Thought

IT must frankly be admitted that there is a wide gap between Dr. Berle's idea of post-war air policy, with its obvious emphasis on American private enterprise, and the much larger degree of internal centralisation and international control favoured by Canada, Australia and New Zealand, and by a strong body of opinion in this country.

Incidentally, Dr. Berle arrived in Britain fresh from a discussion in Montreal with Mr. Howe and other Canadian officials, including the president of T.C.A., Mr. H. J. Symington, at what the Reuter correspondent described as a "hush-hush air parley behind closed doors."

It may, or may not, be significant that an Australian Government spokesman has referred to a suggestion, in some American quarters, that Canada should be the sole representative of the Dominions at the coming conferences on post-war aviation, and said that Australia was backed by Great Britain in opposing this suggestion.

Dr. Edward P. Warner, of the U.S. Civil Aeronautics Board (left), and Dr. Adolph Berle, the U.S. Assistant Secretary of State (right), who have flown to England to discuss post-war air plans.

R.A.A.F.'s Gold Cup

WHEN the Duke of Gloucester, accompanied by the Duchess, visited the Boomerang Club at Australia House recently, he accepted a gold cup which he will present to the R.A.A.F. as a tribute from the R.A.F. when he goes to Australia as Governor-General.

The cup, given by Mr. E. R. J. Mack, of Guildford, was handed to the Duke by Air Marshal Sir Bertine Sutton.

Civil Aircraft Navigators' Licences

DETAILS of the revised examination syllabuses for civil aircraft Navigators' Licences (Wartime) which took effect from March 27 are contained in Air Ministry Pamphlet 44, 13th Wartime Edition.

This pamphlet gives general information about conditions of examination, and copies may be had free on application to the Director-General of Civil Aviation, Air Ministry, CH.8 (d), Parliament Square House, Parliament Street, London, S.W.1.

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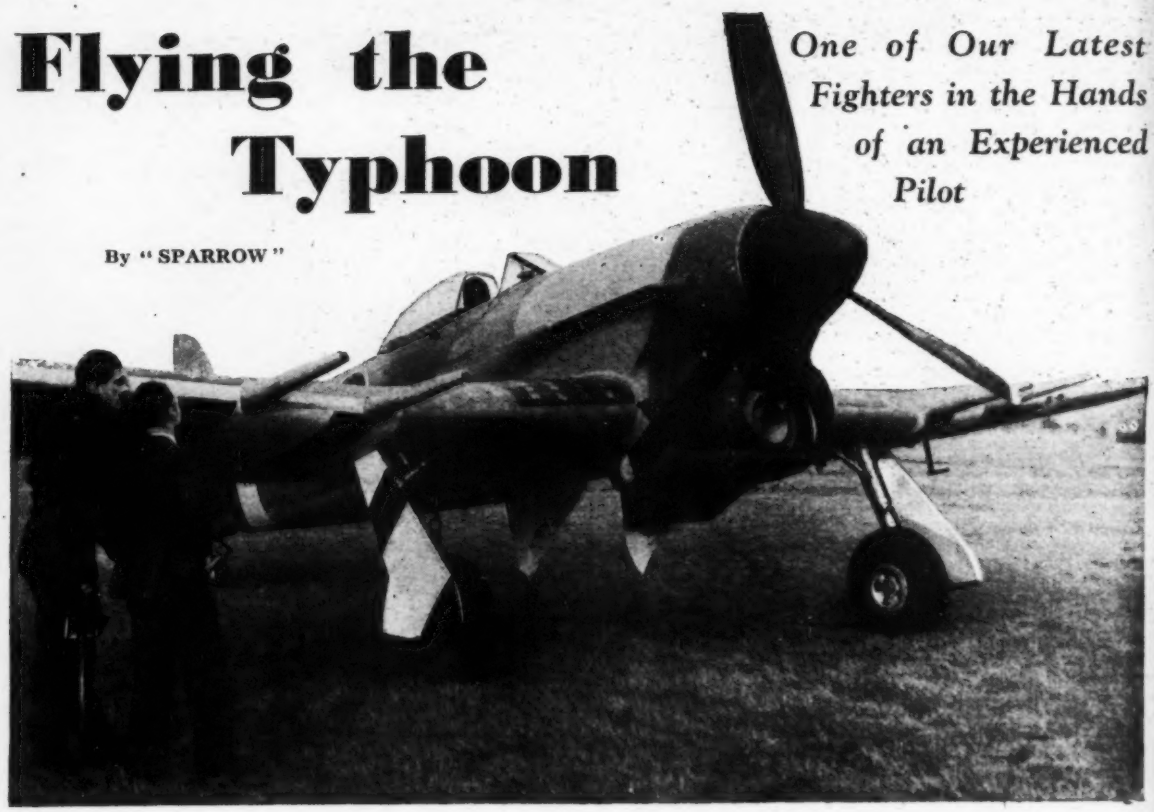
Flying the Typhoon

One of Our Latest Fighters in the Hands of an Experienced Pilot

By "SPARROW"



THIS account of how the Hawker Typhoon impresses those who fly it has been written by a senior test pilot at the special request of "Flight." The writer emphasises, it will be noted, the docility and manoeuvrability of Britain's most powerful single-engined fighter

A PILOT'S first impressions of any aircraft are apt to change enormously when he becomes more familiar with the machine. This is particularly true of the Typhoon, and I am sure that the majority of experienced Typhoon pilots will agree with this.

The predominant impressions of a pilot making his first flight on the Typhoon are of tremendous power encased in a well-rounded, smooth cowling, of handling a rather large aircraft and above all, of great speed.

While taxying, a clear view ahead is obtained with a surprisingly small degree of jinking, and the view in all directions given by the Perspex "tear drop" hood gives great confidence when taxying even in confined spaces.

The cockpit is comfortable and the controls, instruments and auxiliaries are well laid out. The seat is spring mounted up to 4 "G" when it becomes rigid. Springs strung horizontally across the cut-out back of the seat add greatly to the pilot's comfort.

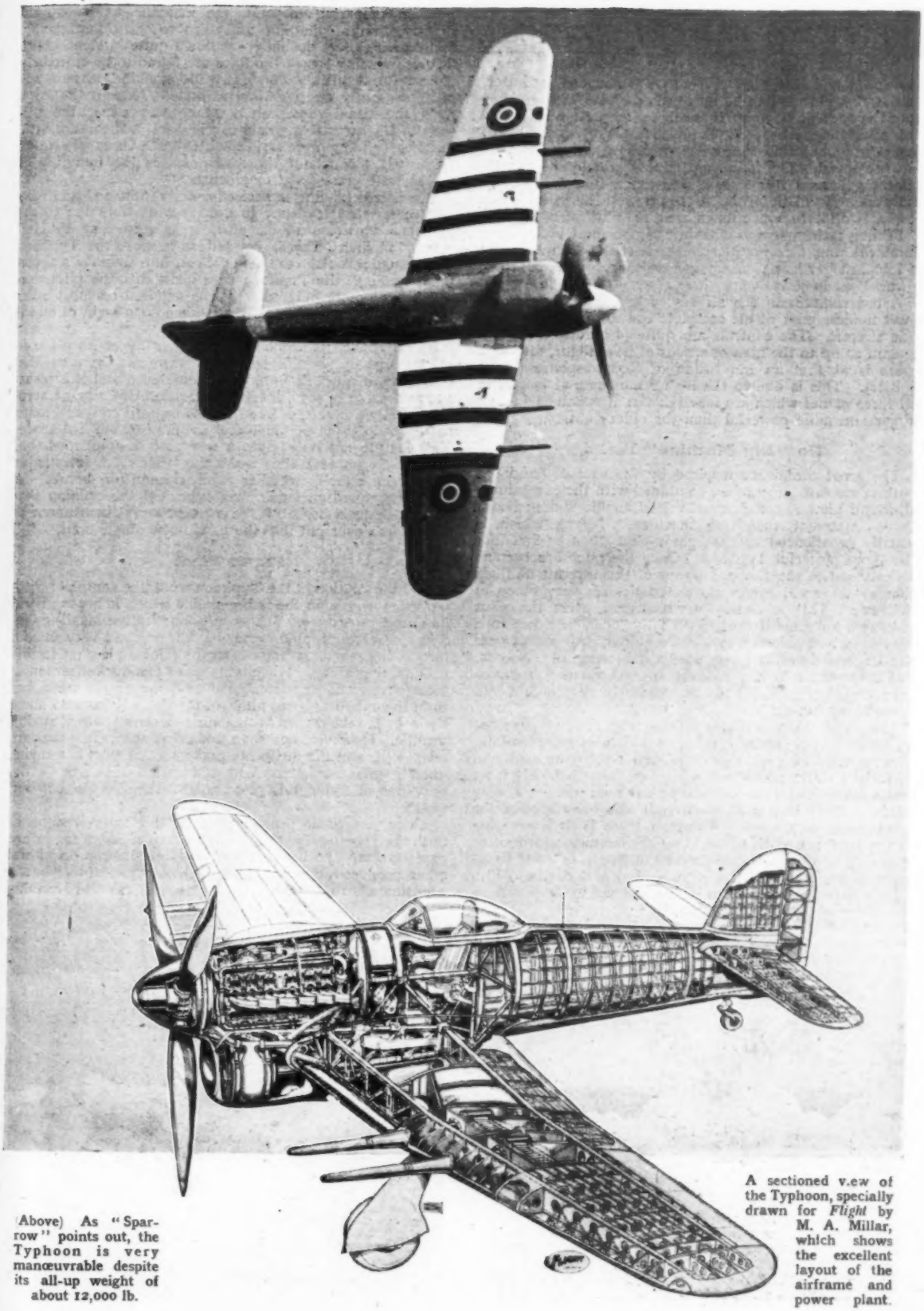
Take-off

On the take-off there is naturally a tendency to swing on such a powerful single-engined aircraft, but this is easily corrected, and after a few flights it is even difficult to remember to which side the aircraft wants to swing.

The undercarriage retracts quite quickly and the machine accelerates rapidly to its best climbing speed.

On levelling off to cruise one is soon impressed with

J. Crosby-Warren, a senior test pilot of the Hawker Siddeley group, about to fly one of the earlier Typhoon types.



(Above) As "Sparrow" points out, the Typhoon is very manœuvrable despite its all-up weight of about 12,000 lb.

A sectioned view of the Typhoon, specially drawn for *Flight* by M. A. Millar, which shows the excellent layout of the airframe and power plant.

FLYING THE TYPHOON

the speed and, after reference to the airspeed indicator, this feeling is found to be no illusion. This high cruising speed is a great boon to those of us whose navigation is not all it might be. At Typhoon cruising speeds, drift angles are small and the agony of navigation is certainly not prolonged. The following "line" shot by a Typhoon pilot emphasises this point. He made that well-known cross-country flight from A to B and his time from "wheels off" to touch-down was 12 min. 50 sec.

Feeling rather pleased with himself his most noteworthy comment was, "It would have been twelve minutes dead if I hadn't got lost." As many true words are spoken in "lines" as in jests.

A few minutes in the air suffice to convince even the most modest pilot of his complete control and mastery of this aircraft. The controls are quite pleasantly light and remain so up to the highest speeds of level flight, although there is at first an impression of slow response (for a fighter). This is due to the higher moments of inertia in all three planes which are inevitable in a machine so much larger and more powerful than the older fighters.

No "Big Machine" Feeling

The great confidence inspired by the ease of handling, both of aircraft and engine, combined with the exceptional all-round view afforded by the jettisonable sliding hood, soon counteract the "big machine" feeling which is usually experienced by the fighter pilot when he first flies the more powerful Typhoon. Once the pilot has become accustomed to the size and power of this aircraft he finds that all the usual fighter characteristics are very much in evidence. This is clearly demonstrated when the pilot discovers for himself that the "Tiffy" can be flown in a very agile and nimble way when required. All manœuvres can be carried out, not only over a wide range of airspeeds, but loops and rolls can be done at rates varying from the very slow and graceful to the extremely snappy but still graceful evolutions.

The thick wing gives extraordinarily gentle behaviour at the stall, and this in spite of considerable wing-loading. The majority of Typhoons drop their right wing gently in a straight stall; just a few machines drop their left wing and a small number merely drop their nose without a wing falling. Even in a high-speed stall, the behaviour of the machine is very good. Although there is little warning of the approach of this stall, recovery is quick and positive and only a very moderate amount of height is lost. In all manœuvres, the Typhoon is very kind and docile. With a little flap, steep turns can be made down to an extremely low airspeed.

When preparing to land, the machine tends to yaw slightly, first to one side and then to the other, as the undercarriage legs do not come down quite in step. After further reducing speed, the flaps are found to be extremely powerful and quickly slow down the machine, leaving one in a pleasantly steep gliding attitude. Due to the large flaps, the actual glide path is rather steeper than the attitude of the aircraft suggests to the pilot, but after a little practice, gliding approaches with "S" turns are quite easy, and throughout these manœuvres the handling of the aircraft gives great confidence.

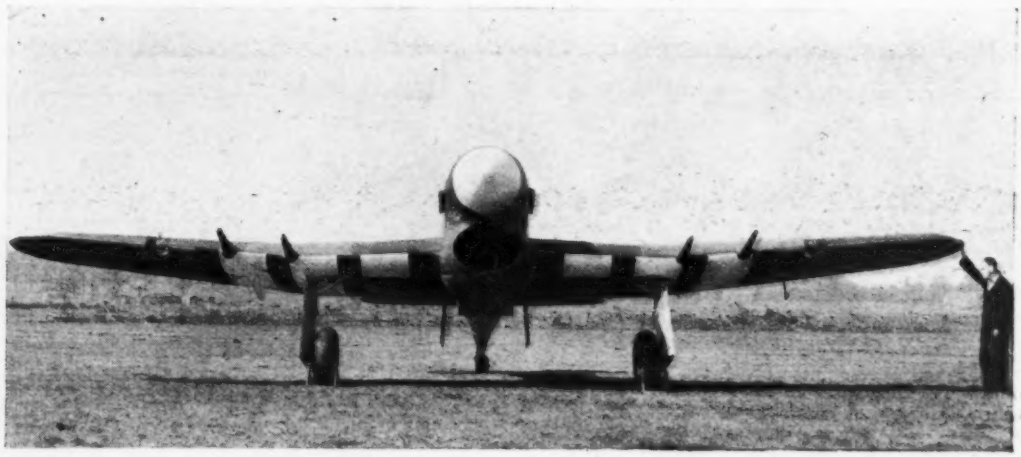
The actual landing is perfectly straightforward and easy and there is no tendency to drop a wing but, due to the generous provision of elevator, it is very easy to land rather tail first. This is not serious because the Typhoon and its undercarriage are very robust, but, to make a three-point landing, the Typhoon does insist that the pilot uses just a little more judgment than is required on most other types which are not provided with such a margin of elevator control at slow speeds.

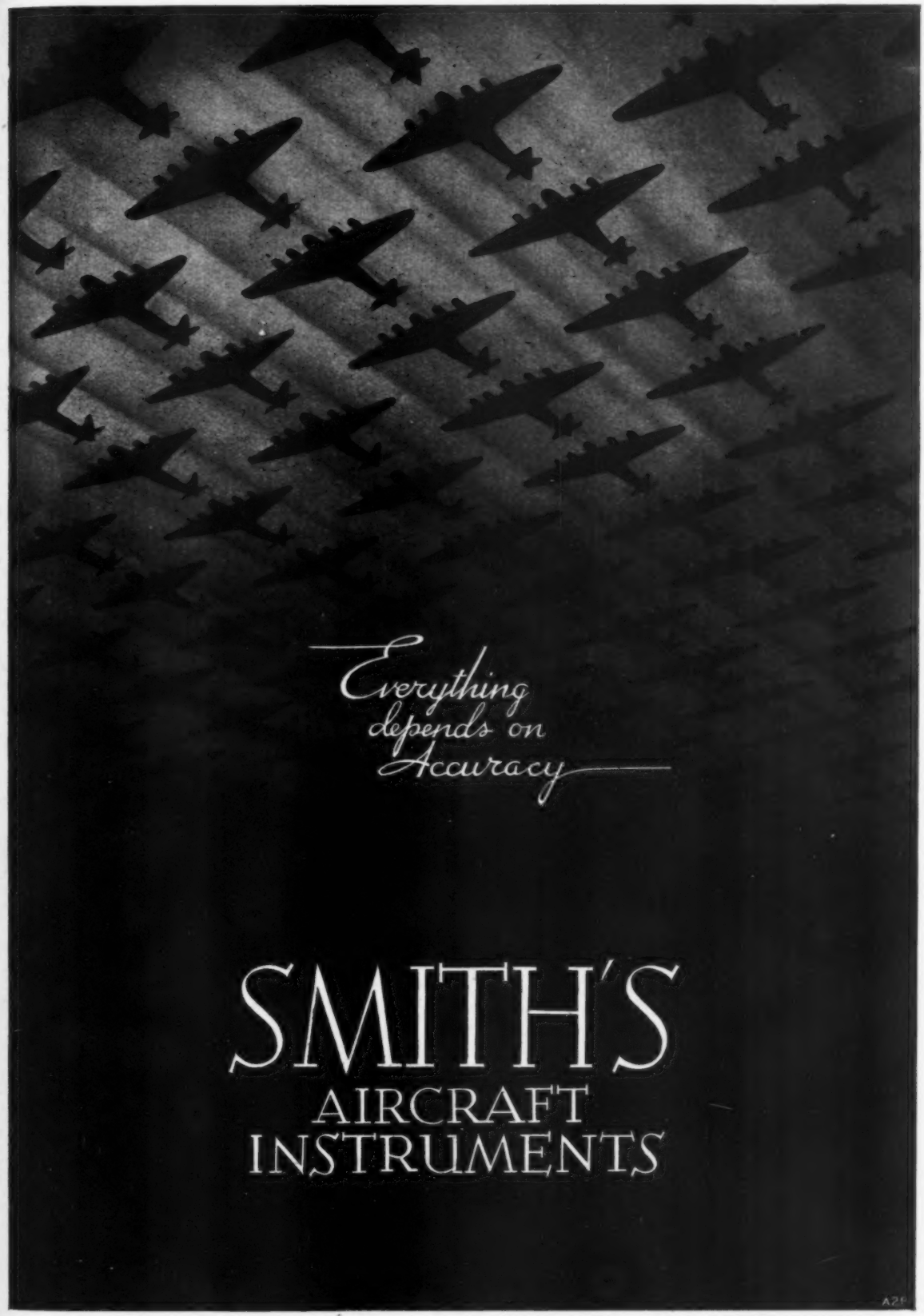
The Typhoon is a good aircraft, worthy of its place in a long line of fine English single-seaters. On peaceable occasions, it gives its pilot great confidence and is a pleasing and exciting toy for letting off steam by way of aerobatics. Its power and speed enable upward rolls and loops to be made to cover 6,000 feet or more of vertical space. This feature not only gives a new zest to aerobatics, but these same potentialities make the "Tiffy" a formidable fighter in attack, whether with cannon or bomb. A Typhoon squadron leader has expressed the opinion that this machine is probably the most powerful instrument of destruction ever put into the hands of a single man.

Power Plant

No appreciation of the Typhoon would be complete without a few words on the Sabre engine which helps to give it its fine performance. The twenty-four (rather small) cylinders and the high revolutions give this engine a very smooth torque diagram, and imparts to the pilot a pleasant feeling of humming along. The engine gives one an impression of great power and this, combined with the considerable roar from the exhaust, is apt almost to frighten those who make their first take-off on a machine of this power at full throttle. However, one soon finds that any misgivings are misplaced, and the flexibility and smoothness of the engine quickly give confidence and add their full share to the pleasures of flying this great combination of aircraft and engine.

There are great potentialities in the basic designs of both the Hawker Typhoon and the Napier Sabre for future exploitation. The lineal descendants of these progenitors, when produced, may well surprise even those of us who are accustomed to present-day performances and striking powers.

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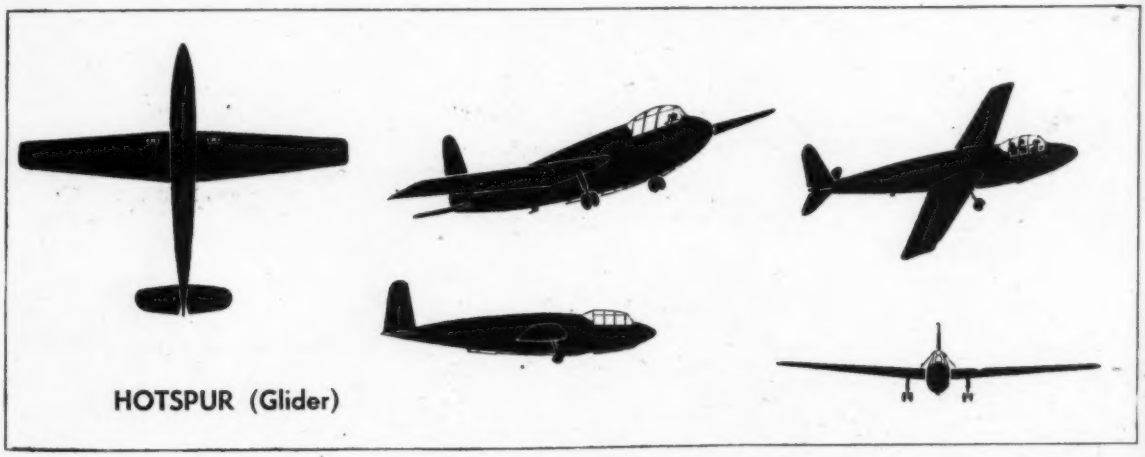
Hawker Tornado

These pictures afford an interesting comparison with those of the Hawker Typhoon published on preceding pages. Basically the two types are similar, and the Tornado may be regarded as the forerunner of the Typhoon. The former, it may be recollected, was designed for the Rolls-Royce Vulture engine, the latter for the Napier Sabre. When the Ministry of Aircraft Production decided to go into production with one of these only, the choice fell on the Sabre, and the Tornado was dropped. The most pronounced difference between the two aircraft types is the longer nose of the Tornado This resulted from the X formation of the Vulture engine, which could not be placed above the front spar, as is the Sabre in the Typhoon. The Tornado had a wing span of 41ft. 7in., a wing area of 280 sq. ft. and a loaded weight of 10,030 lb. The speed was 425 m.p h. at 23,000ft.

Studies in Recognition

Aircraft in Fi

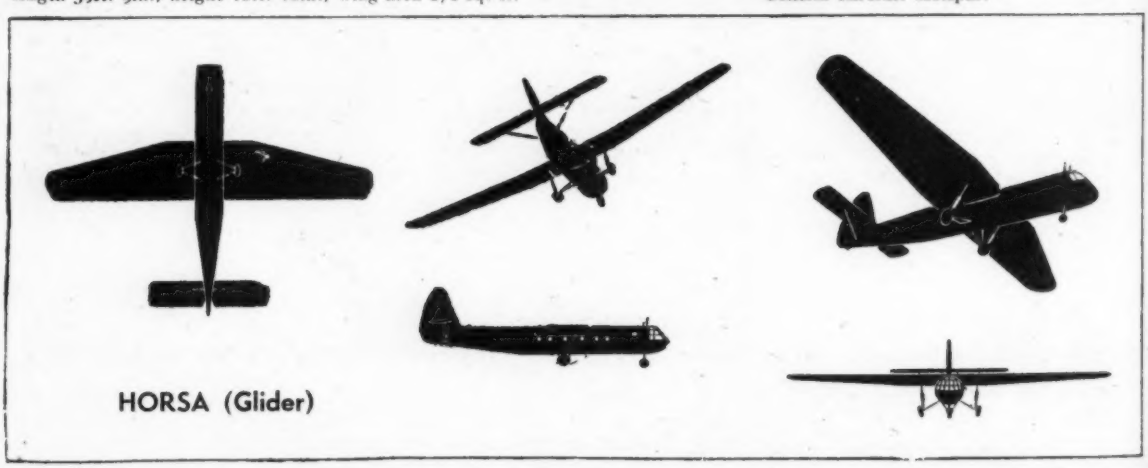


HOTSPUR (Glider)

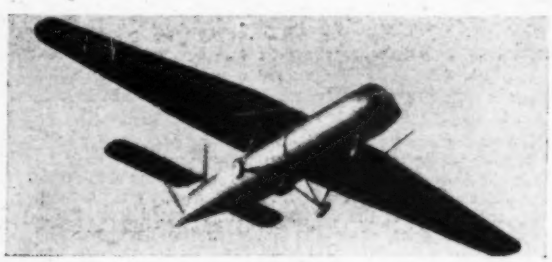
OF particularly clean design, the General Aircraft Hotspur is the standard trainer for glider pilots of the British Army's airborne forces. It is built entirely of wood, with plywood skin, and is very well finished. Two of its eight occupants are pilots and enter and leave the aircraft via the hinged cabin cover, the remainder using a door in the side of the oval fuselage behind the wing. Maximum permitted towing speed is 120 m.p.h. and normal free gliding speed 80 m.p.h. Split flaps steepen the glide path and slow the landing speed.

Recognition features include symmetrically tapered mid-wings with square tips, tapered tailplane with round tips, very high aspect-ratio fin and rudder with round apex; well streamlined fuselage with "snake's head" cockpit cover; twin landing wheels (jettisonable). Dimensions: Span 45ft. 11in., length 39ft. 9in., height 10ft. 10in., wing area 272 sq. ft.

General Aircraft Hotspur.



HORSA (Glider)

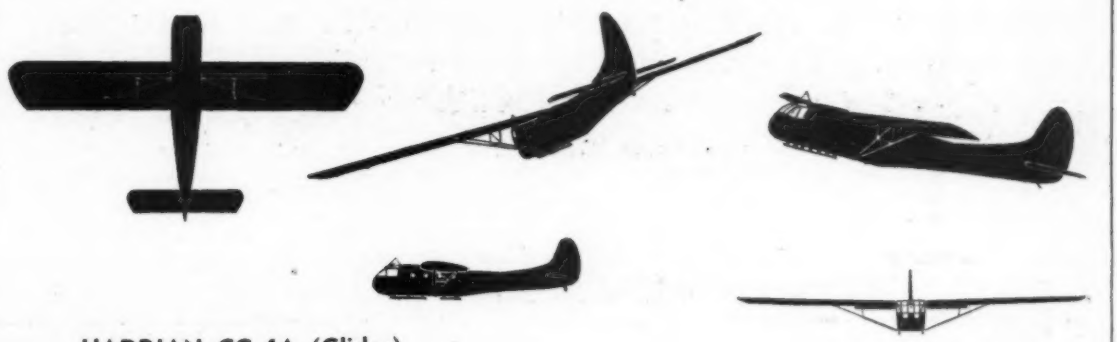


Airspeed Horsa.

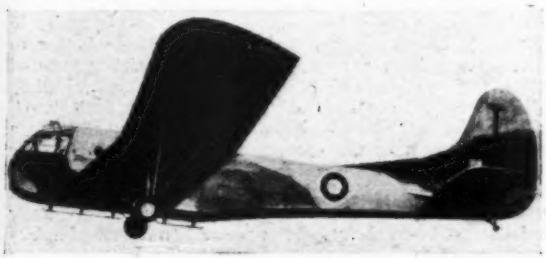
BRITAIN'S standard glider transport and troop-carrier, the Airspeed Horsa can accommodate 25 men during training. On operations, however, a rear gunner is carried and the number of troops reduced to 20 fully equipped men. Wooden construction is employed, with plywood and fabric covering. "Spoilers" are fitted above and below wings besides split trailing-edge flaps. Large door on port side of nose forms loading-ramp when lowered. Main wheels of tricycle undercarriage only are dropped after take-off.

Recognition points comprise circular-sectioned fuselage with very long nose; high, cantilever wing with flat rectangular centre-section and outer panels tapering on leading-edge only, raked tips; rectangular, strut-braced high aspect-ratio tailplane mounted part way up fin. Dimensions: Span 88ft., length 67ft., height 21ft., wing area 1,104 sq. ft.

ing Attitudes



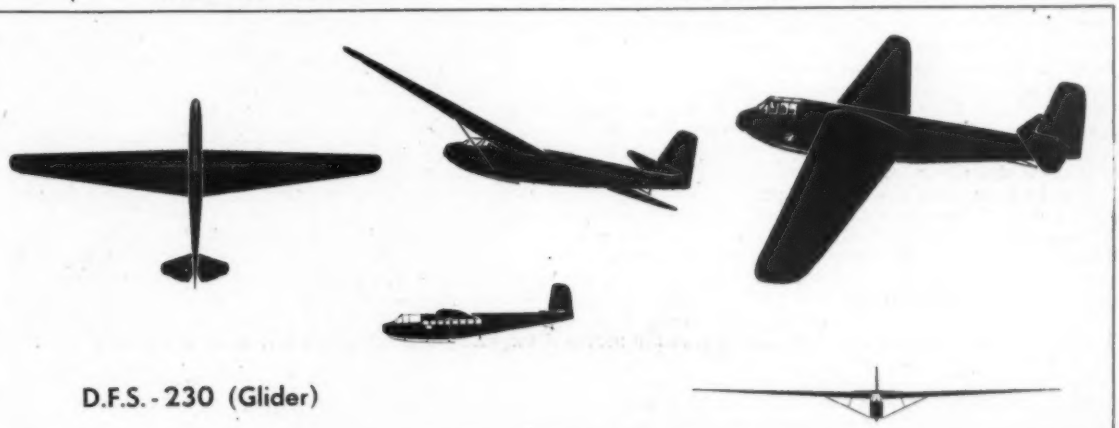
HADRIAN CG-4A (Glider)



Waco CG-4A Hadrian.

BUILT by Boeing, Beech and Ford as well as by its designers, the Waco Aircraft Co., the CG-4A is the standard transport-glider of the U.S.A.A.F. and is also in service with the R.A.F. under the British name of Hadrian and, significantly enough, was first used to invade Sicily. It carries 15 armed troops, or a jeep with crew of four can be driven in via the nose section which hinges upwards.

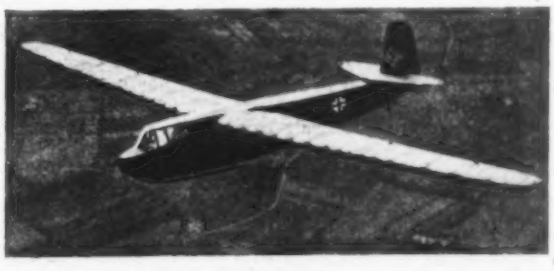
Molybdenum steel tubes are used for the fuselage and wood for the wings, all being fabric covered. Main wheels of normal landing gear can be dropped. High aspect-ratio wings and tailplane of similar plan have parallel edges and raked tips, the wings being braced by Vee struts. Large single fin and rudder with dorsal spine similar to that of Fortress; slab-sided fuselage tapers aft of wings. Dimensions: Span 83ft. 8in., length 48ft. 8in., height 15ft. 4in., wing area 900 sq. ft.



D.F.S.-230 (Glider)

DESIGNED by the German Institute of Sailflying, the D.F.S. 230 is about the cleanest of enemy transport gliders encountered in action and was first used for the invasion of Crete. Carrying only nine men, it was reported to have been used in trains of up to six behind a Ju 52/3zm transport tug. Its fuselage is mixed steel tube and wooden construction with plywood and fabric covering, and the wings are strut-braced wooden structures with stressed plywood skin. "Spoilers" are fitted to the upper wing surfaces as well as normal flaps.

The high aspect-ratio tapered wings and deep, narrow, slab-sided fuselage should prevent any confusion with current Allied gliders; fin and rudder are tall and taper only slightly to a blunt apex. Small tailplane is set ahead of fin and tapers mainly on leading edge. Dimensions: Span 72ft. 4in., length 37ft., height 9ft. 4in., wing area 410 sq. ft.



D.F.S.-230.

Indicator Discusses Topics of the Day

Literary Interlude

Can the Pilot Describe His Feelings and Thoughts Without Reducing His Capabilities? : The Need for Sophisticated Novels and Biographies on Flying Subjects : The Romance of Realism : What We Can Expect from the Publishers

I OFTEN wonder if any really outstanding pilot, whether operational or otherwise, is ever likely to have the sort of temperament and self-searching capabilities which will allow him to write an equally outstanding book. Probably the two types of person can never be rolled into one, so we shall never have a real classic written with feeling and understanding.

But we're still waiting for just such a book. There have been good books, and some very bad ones indeed, dealing with the air and aircraft as they are seen and "felt" by the people who actually do the flying, but only one or two of them have been fit to read over and over again. I doubt if one of them has really given the ordinary person insight into the genuine feelings, and talk, and outlook of the flying man

Perhaps we shall have to wait for it. No person can do two jobs, each requiring all the available nervous vitality for their satisfactory completion, with success—and the flying people are all very busy flying at the moment. Anything written must necessarily be haphazard and half-finished while the war is on, and we can only hope that those who are really competent to produce the books may be spared, and may still be able to recapture all their old emotions and to remember all the millions of little things that make up the average day at an airfield and in the mess.

Furthermore, I have a strong feeling that the sort of self-probings and efforts of imagination needed to produce what is wanted in a big way would make a man unfit to carry on with the flying. He would see himself and the complicated workings of his nervous system much too clearly to be able to face a repetition of anything about which he might have written. I believe it was in a book called *I Wanted Wings* that the author found, after writing an article (which became a chapter in the book) for a magazine, describing all the sensations and thoughts during half an hour's aerobatic practice on a Curtiss fighter, that he became terrified of the little beast and lacking confidence in himself. This state of affairs was only cleared up when, while doing a night cross-country, his Conqueror engine packed up and he found that, quite automatically, he had changed over tanks and gone through his engine-failure "drill." I think it was in the same book that the author suggested this natural effect on the nerves as a reason why, when anything out of the ordinary happened, a pilot was usually so reticent about it all. Instead of going into a long explanation of his actions and feelings he might say, in effect, "The wings came off, so I baled out . . ." and leave it . . that, drifting off towards the bar for a very necessary stiffener.

Fatalistic Haze

Not that I have any sympathy for the film-producers, and others, who would have us believe that flying people spend their spare time in a sort of fatalistic and melodramatic haze. It just isn't true to life. Though, with the added hazards of wartime, pilots tend, more often, to play the fool and go off on occasional "benders," their spare time is spent very much in the same way as it would be spent by an insurance clerk or a haberdasher's assistant Nor do they ever talk or think about the "little lady in the power-blue gown who would get them in the end," or any nonsense of that kind. In fact, when somebody in a film or on the radio which in any way dramatises the business of flying, members of an air crew are the first to feel and show deep embarrassement, and even resentment.

It is merely that, in sheer self-preservation, they prefer not to delve into their innermost feelings and are, in any case, unlikely to rush into print so long as they are living amongst others who might, quite easily, consider that such rushing into print constitutes a line-shoot of maximum size. And flying, particularly with these present-day lethal devices, takes it out of one in a peculiar and inexplicable way, so that it is almost impossible to settle down afterwards to such pursuits as reading and writing. Hence the fact that the average pilot drinks more than he would do in peacetime. He doesn't do so in order to "forget"; he merely can't think of anything better to do or of anything more pleasurable than sitting around amongst his cronies talking shop and drinking half-pints of beer in order to loosen the tongue. There is no "shop" quite as enthralling as flying shop, and flying itself is a profession and a hobby thrown into one, so that nothing one can do will provide really adequate relaxation—unless it is sport, or some kind of work with the hands. A most surprisingly large number of pilots make things—generally model aircraft—in their spare time, and that sort of hobby seems to be the most satisfactory form of relaxation, since no great degree of brain effort is required, the job is one quite different, and there is something to be shown for the work in the end.

Time and Perspective

After the last war there was a very long gap before any really worthwhile books were published about it. That, I think, was not so much because the reading public (and consequently the publishers) were heartily sick of the whole thing, but because the prospective writers were even more sick of it, and years had to go by before they could face, with pleasure, the idea of conjuring up all their memories. In the meantime, the unpleasant memories had faded, and the proceedings had, in their minds, a certain adventurous jollity which could be savoured in retrospect. People rarely write merely for a living; they write because they want to write, and, in general and forgetting the penny-a-liner, they write only *what* they want to write. So in about 1950, unless we are all in the Far East for years longer than we hope, we shall have a spate of really good books about this war, and, we hope, about the flying side of it in particular. Greying slightly at the temples, those who have any sort of itch to put their impressions on paper will get down to it with pleasure and energy. As I've said, I only hope they haven't, by then, forgotten quite all they really felt and thought.

Heaven preserve us from the sort of *Fourth Form at St. Spindlelegs* books by young fighter pilots—all boys together and having such a jolly time in the empyreum, with their Spits and Tiffys, shooting down the nasty Huns. There have been one or two like that published in this war, and the authors, growing older by now, are probably feeling fairly ashamed of themselves. Neither living nor flying is at all like that; we want sophisticated stuff, with none of the corners worn off. The shock of seeing bits coming off one's aircraft; the smell of the beast when one climbs in; the acrid stink of cordite fumes as the cannons

LITERARY INTERLUDE

rattle; the feeling one has on a D/R cross-country when no familiar landmark has been recognised for quite some time; the relief as one flies out of a sticky front into fine weather and blue skies; the horrid hope that the recalcitrant port engine will really refuse to start and leave one to return to the mess; the pleasure of doing a really good, clean roll, barrelled just enough for you to retain the seat beneath, instead of above you; the grim silliness of the earth as it appears from twenty-five thousand; the sudden realisation that the stick no longer operates the ailerons . . . oh, millions of things will be remembered by those who really want to remember.

No doubt there will be a fair selection of dull but informative books by brass-hats and back-room boys. Some of them may even be more dull than informative—war versions of the sort of thing we used to read (for want of anything better) in the school library.

As I say, those books will undoubtedly appear and be enjoyed by the few who were intimately connected with the circumstances described, but I'm talking about real books and real people. Books about ordinary men who lived in wooden huts miles from the mess; who sat playing poker in muddy flying boots at dispersal, or waited around in the hope that the Met. people would, after all, cancel the night flying; and who were partly surprised, partly shocked, and partly afraid when things really began to happen. We'll read them—but not, I fear, until the war has been over for quite a while. I'm only asking those who have the ability and the itch to write to see that they forget nothing; such books will reduce the horrors and discomforts of peace to a bearable degree.

INDICATOR.

NEWS IN VIEWS

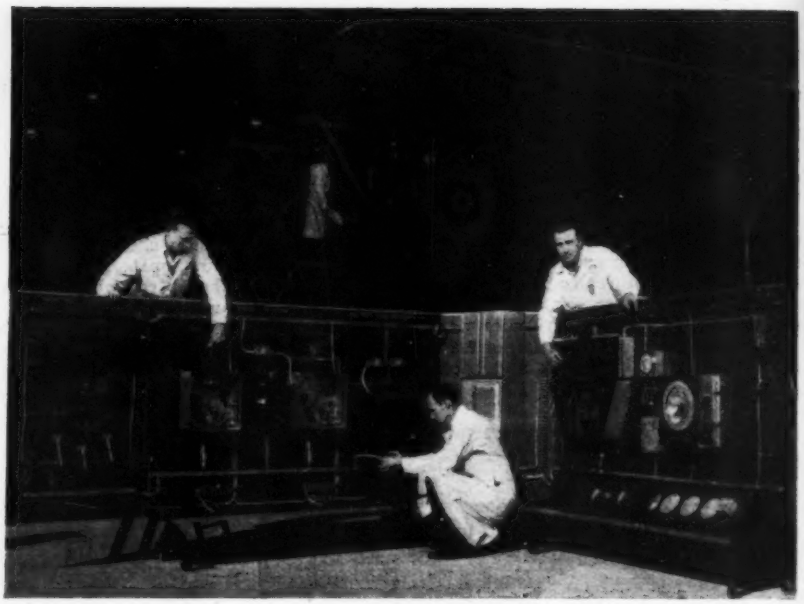
Fin Ends.—Two kinds of fin are the chief points of interest in the pictures above and on the left. The former shows a scale desk model of the modified Liberator to be produced for the U.S. Navy and is the only photograph of any kind so far released for publication, showing the new single fin and rudder and somewhat longer fuselage. No official general arrangement drawings have yet been issued. Incidentally, Consolidated Vultee turn out these solid models to exact scale (for engineering purposes) by assembly line methods using dies and moulds which are miniature counterparts of those used in producing the actual aircraft.

Top left gives an impressive view of one of the new 12,000 lb. bombs (an unholy trinity of 4,000 lb. sections) from the fin end—the "fin end of the wedge" being driven into German aggression, as it were!

In-line Argus.—Smart spotters will at once recognise the aircraft on the left as a Fairchild Argus by its undercarriage and wing strut arrangement, in spite of the in-line nose. This is the UC-61K powered by a 200 h.p. inverted, in-line, 6-cyl. air-cooled Ranger instead of the 165 h.p. Warner radial engine fitted to the familiar Argus (UC-61A) used by the R.A.F. and A.T.A. as well as the U.S.A.A.F.

Mobile School Unit

Air and Ground Crews of U.S. Air Transport Command and Troop Carrier Command Have Visiting Classrooms : How Intricacies of Skymaster are Taught



Checking the unfolded electrical panels in front of a C-54 used for training purposes at Santa Monica.

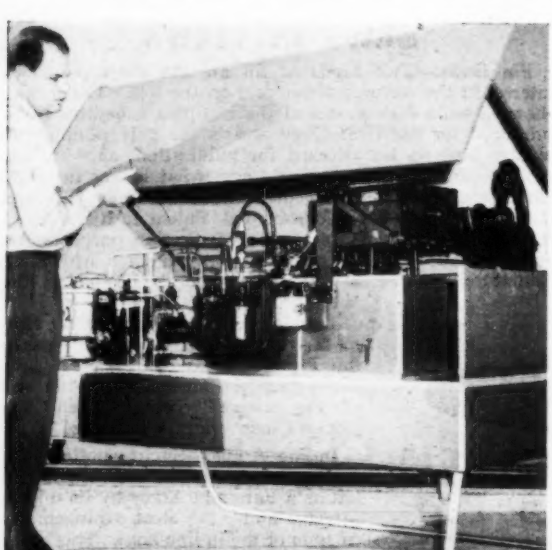
MAHOMET cannot come to the mountain so the mountain is taken to Mahomet. The United States Army Air Forces are scattered widely over the surface of the earth, and although initially trained ground crews were sent with the groups and wings, it has been found that new types are added in the various theatres so frequently, and modifications and new equipment lead to changes in older types, that it became a problem how to ensure that crews were kept up to date. To send them home from distant stations was not very practicable, and a very satisfactory solution was found by Technical Training Command in travelling classrooms, mobile training units in which the different mechanical services, equipment and accessories are shown in actual operation.

Before long there will be such travelling units for every American operational type of aircraft. Already the units include the following types: P-39; P-38; P-40; P-47; P-51; A-20; B-25; B-26; B-24; B-17; C-46; C-47; C-54. A unit for instructing in the servicing of the B-29 is now being got ready.

M.T.U. 96

While equipment varies with the particular type of aircraft, a bomber unit usually includes mock-ups and sectioned examples of the engine, automatic pilot, bomb-release system, communication system, bomb sights, gun sights, and turrets, as well as the usual functional systems.

As an example of these mobile training units we have taken that for the Douglas C-54 Skymaster, which took the road early this year and is known to the U.S. Western



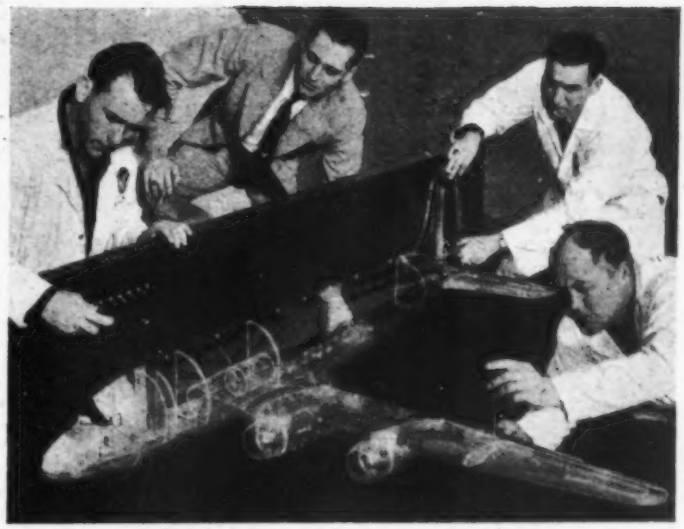
One of the boxes in M.T.U.96 contains the complete operating display of the automatic pilot of the Skymaster. Folding legs raise the box to a convenient height.

Making adjustments on a hydromatic airscrew. The operation of the governors and the entire "feathering" action can be demonstrated.

Technical Training Command as M.T.U.96. It is, perhaps, the most complete and elaborate outfit introduced so far.

M.T.U.96 is contained in two trailers towed by a lorry. It is attended by nine men, including six sergeant instructors and a Douglas field service representative, all expertly trained specialists in the operation of the engines, the hydraulic and electrical services, the instruments, the automatic pilot, radio, de-icing and fuel and heating systems of the C-54, and the hydromatic airscrews. Designed to teach maintenance engineers, pilots, air crews and engineering officers of the Air Transport Command and Troop Carrier Command, the unit visits bases and training fields, giving intensive courses which last from two weeks to two months.

The "classroom" comprises chiefly the mechanical devices and instruments, mounted on polished birch panels. These panels hinge together to form the sides of eight large boxes, small caster wheels under the boxes facilitating the unloading and loading of the boxes and their transport to and arrangement in the hangar or room used for the demonstrations—unless these are held in the open. Since M.T.U.96 went on tour, Douglas engineers have installed similar equipment on panels to be carried in Douglas C-47 transports for training men overseas. This airborne unit includes a full-size sectioned engine.



Final check-over of the Skymaster functional half-model in Plexiglass. The switches operate lights throughout the model, which contains all the operating lines and systems of the C-54.

Forming the "key" to the unit is a half-model of the Skymaster, built in Plexiglass. This is completely transparent, and is about 6ft. 6in. long. It contains all the functional systems of the Skymaster in miniature, and switches at the top of the panel turn on the various navigation, recognition and landing lights, as well as all the individual lights inside the aircraft. Thus all electric leads can be traced from their batteries or generators to the points they serve.

One of the boxes contains an exact replica of the instrument panel, and all the engine instruments work as on a pre-flight engine test. "Trouble-shooting" as well as engine runs can be taught.

A second box contains a complete hydromatic airscrew with blades clipped. A Plexiglass dome covers the hub, and the student can see the whole operation of the governors and how to adjust them. On one side of this display are the de-icing systems for the airscrews and carburettor. Transparent pipes show the flow of the fluid.

A third box contains the entire hydraulic system, showing how the wheel retraction is done, the operation of wheel brakes, cowling gills, etc.

On the electrical display panels are the switches and operating gauges of some 20 circuits of the C-54. Here, too, is shown the working of the undercarriage warning system, emergency alarm bell warning for baling out, and electric warnings of flames in an engine or cargo compartment. Other panels show how the fire extinguishers in the engine nacelles work, the functioning of wing and tail de-icers, and the nose heaters.

Engine specialists can study the actual flow of fuel (red in the demonstration set-up) through transparent pipes, and can follow its course from the tanks through the strainers, boost pump, firewall shut-off valve and engine-driven pump to the carburettor. Every aspect of aircraft maintenance and servicing is covered, and each of the displays also includes such other aids as sectioned mechanisms, drawings, charts and wiring diagrams.

INTERCHANGE of TECHNICAL INFORMATION

AT the request of Mr. Oliver Lyttelton, Minister of Production, Mr. Geoffrey Smith, M.B.E., Managing Editor of *Flight* and *Aircraft Production*, is proceeding to America in connection with the interchange of technical press information.

A Captain in the R.F.C. and R.A.F. during the Great War, Mr. Geoffrey Smith, who is a director of Iliffe and Sons, Ltd., has served on four Government committees in the present war, including committees of the Ministry of Information on censorship matters.

He is the author of the first book to be published in Britain and the U.S.A. on jet propulsion now brought to a practical stage of development by the British engineer, Group Capt. F. Whittle, C.B.E., R.A.F.

THE CAMERON ROTOR PLANE

FOLLOWING publication in our issue of March 30th, 1944, of the article on the Cameron Rotor Plane we have received from Mr. Cameron certain additional information concerning this highly original aircraft. It will be recalled that one of the special features is the the use of retracting rotor blades. There is, Mr. Cameron informs us, no need for engine or hand operation of the retraction, the blades of a 38ft. rotor, for example, developing approximately 64 h.p. when autorotating, and the power actually required being only something like 3¼ h.p. For extending the blades the power required is, of course, even smaller.

When the rotor blades are extended, the ailerons are operative by virtue of the fact that they are in the slipstream from the two wing-mounted airscrews, the wing being vertical during helicopter ascent. Since these airscrews rotate in a direction opposite to that of the main lifting rotor, they counteract the torque reaction from it.

NOVEL U.S. SUGGESTION

A "VOICE from beyond" is under consideration to cut down on airline accidents, according to our contemporary *American Aviation*. The Civil Aeronautics Administration is discussing the installation in each passenger aircraft of a recorder to preserve every word spoken in the pilot's compartment. It is hoped by this means to learn the causes of crashes such as a recent one in which both pilot and co-pilot were killed.

The recording device would be enclosed in asbestos and placed in the tail of the aircraft. So long as the pilot lived, he would have exclusive possession of the record of his conversation. But should his aircraft crash in flight, this record would be turned over to Government authorities. It is pointed out that present ground-air communication between pilot and control towers is not always satisfactory when an aircraft gets into difficulty. Both pilots then are too busy to give the control tower a running account of what is transpiring, but their own conversation might give a tip-off to what was happening. This information could be invaluable to both Government and industry in preventing future accidents.

Behind the Lines

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries

More Hot Air

THE first number of the Fascist weekly paper called *Ali* has just appeared in Venice, with an introductory article by General Arrigo Tessari, Under-Secretary of State for Air, defining the Fascist Government's new task in aviation.

Luftwaffe's Cordon Sanitaire

"THE Moscow radio states that the Germans have seized the Hungarian Air Force with its entire personnel and material and incorporated it in the *Luftwaffe*," says Reuter. "German occupation authorities have issued a proclamation for the mobilisation of the Hungarian airmen."

Comment

THE German overseas radio, quoted by Reuter, said: "There have been many losses to the German night fighter strength, but production is well concentrated in this vital field. British bomber crews are tough fighters, and we have gone through some critical times in past months. German night fighter tactics have had to be adapted to the enemy's improved tactics."

A German View

FLYING boats accommodating 100 to 200 passengers with a cruising speed of 250 m.p.h. will be used on the future transatlantic commercial air routes, declared Dr. Richard Vogt, the chief designer of the Blohm and Voss aircraft works, which are producing the six-engined B.V.222 flying boat.

Vogt believes that the question whether land or sea aircraft will be used for long-distance services in the future has been settled in favour of the flying boat. An Atlantic crossing in these flying boats takes 12 hours and offers all possible comfort to the travellers. Business men who wanted to save two hours might use small stratosphere land aircraft, but they would be far more cramped. The aircraft will be equipped with a large number of engines to guard against the necessity of making an emergency landing because of engine trouble.

Morale

"BEFORE March 14th it was rumoured in Bratislava that it was unwise to remain in Bratislava on that date, because the city would be raided by British aircraft, and if not by British, then by Bolshevik, and if not by Bolshevik, then by German aircraft," complains an Axis newspaper.

"Well-informed whisperers," says the article, "explained that the Germans wished, by bombing, to force the inhabitants of Bratislava to leave the city, as many Reich offices, Hitler's H.Q., and the entire German Government intended to move to Bratislava. These 'well informed" persons knew, moreover, that buildings left by the evacuees had been confiscated for the Germans. It would hardly be thought that anyone would believe such nonsense, but what happened? Wealthy people, who are deriving the greatest benefit from our independence, fled from the Independence celebrations. They were not a great number, but quite enough. Such people ought to be exposed; they should be marked as 'these well informed ones who hold direct information from Moscow or London,' as well as cowards and panic-mongers."

Call-up

ALL German able-bodied men belonging to the age groups 1884 to 1893 who have not been previously called up were recently asked to register.

Wild Sow

THE fundamental idea of the new night fighter method developed by *Luftwaffe* Col. Herrmann—who was recently decorated with Swords to the Knights Cross of the Iron Cross—is described in detail by the D.N.B. "The old night fighter system," says the German News Agency, "had to be enlarged to allow for the use of single-engined aircraft which are known to be very fast, very manœuvrable, and whose armament is at least as powerful as that of the heavy twin-engined fighters. In addition, the single-engined fighter offers a comparatively small target to the attacking enemy and the pilot is safer and more protected behind his armoured engine.

"The fuselage of most of these night fighters bears the picture of a galloping wild sow, the symbol of the new successful single-engined night fighters. In contrast to the heavy fighters, the 'wild sow' is mainly used over the actual target area. The massed use of several hundred single-engined fighters over a raided town was bound to cause the enemy heavy losses.

"A definite area is allotted to each night fighter formation, these being divided up so that approaching enemy formations must always reach the area of definite fighter formations and are thus continuously attacked and fought by ever-new night fighter formations.

"The 'wild sow' night fighters search out their victims at great heights. In the glow of enemy flares, in the lights of our own flares, and over the clouds illuminated by our strong A.A. searchlights the night fighter sees the enemy bombers crawl along like bugs over a sheet—often the enemy crews are dazzled to such an extent by their own fireworks that they only recognise the small dark dots of the attacking night fighters at the last moments, and then it is usually too late.

"The 'wild sow' night fighter technique requires special skill, for a single-engined fighter cannot remain in the air all night and petrol shortage forces the fighter to land after a time.

"The successes of the German night fighters are not the individual results of particularly outstanding pilots, but of many excellently trained crews.

"The use of the 'wild sow' can only be shown by results. The first effect of this new process of night fighting was that the British immediately confined their night attacks to dark nights and during pronounced bad weather conditions. But dark nights and close ceilings of cloud no longer present a problem to the pilots of the 'wild sow' as long as moving clouds and ground fog do not make a safe landing impossible at all operational stations all over the Reich.

"Our technical aids and instruments have been made so delicate that attacks against British terror formations have become more and more effective. The current development and further strengthening of our formations are naturally not completed."

GERMANY'S ARSENAL: The Steyr works in Austria which were recently attacked by Italy-based Forts and Liberators. One of Europe's oldest and largest munition enterprises, they cover a built-up area of 460,000 sq. yd., and comprise a foundry, a ball and roller-bearing plant, steel works at Judenburg on the Mur, and produce motor vehicles, small arms and aircraft components.

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The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

THE NAPIER SABRE II

Too Complicated and Vulnerable

YOUR very excellent review of the Napier Sabre II aircraft engine calls for congratulations to the draughtsman who made those magnificent drawings showing every detail so very clearly. The drawing office gets very little publicity or praise either in war or peace, and yet it is from that source that modern wars are won or lost to a large extent. I might add that the work of a draughtsman is most gruelling and trying, bent over a drawing-board day in and day out, and often working with very trying artificial light in these black-out days.

As regards the actual design of the Sabre II, it does not appeal to me in any sense as a war job. In the first place it seems to me that it is far too complicated and has too many gears and working parts to be easily produced in large quantities. In other words, it takes far too many man-hours to produce and all very delicate work to fine limits.

Again, its "percentage of vulnerability" from flak or bullets appears to be very high. This is a very important point in wartime. Then, of course, there are the chances of failure of any of these numerous working parts and their lubrication requirements.

Napiers, having built under licence in peacetime, the two-crankshaft Jumo diesel aircraft engine, appear to me to have missed the mark in not developing that really perfect system as a two-stroke petrol aircraft engine. The scavenger pump would in that case become the petrol vapour pump supplying the cylinders with the necessary mixture from a carburettor. We should then have an engine greatly simplified without valves and their attendant drive mechanism and also the entire elimination of cylinder heads and gaskets and holding-down bolts. This represents a lot of weight saved. Having double the number of power strokes you need only have half the number of cylinders, again saving a colossal amount of weight. Having two pistons in one cylinder you would then only require one sparking plug to two pistons. So that instead of having 48 sparking plugs as shown in the Sabre II you would only require 12. Again a great saving in weight and mechanism.

You would also only have six long cylinders against the 24 cylinders shown in the Sabre II to get the same power.

J. R. GOULD (Major, late R.A.F.).

Top Overhauls Very Simple

MAY I express my appreciation of the article on the Napier Sabre II? (*Flight*, March 23rd).

I consider that we should all take off our hats to Major Halford and team for this contribution to the war effort, although it was not designed in wartime.

There was, I believe, one technical error in the article. The writer refers to fully floating gudgeon pins which are secured by circlips. Fully floating gudgeon pins *are* fully floating and, as a rule, have bronze or aluminium end pads. I have seen cases where gudgeon pins have done more than float, because an end pad has been left out during assembly and caused a beautiful score in a cylinder bore. [The gudgeon pins *are* fully floating and are retained by circlips in the bosses.—ED.]

No doubt some readers will remember Major Halford at motor race meetings at Brooklands and elsewhere, with a modified car which he called the "Halford Special." I forget the original make of the car, but it was a good performer in its "hotted up" state.

I am afraid I cannot agree with your correspondent in *Flight*, March 30th, C. A. Glasshouse, who suggests that "Sabre" maintenance must always be a headache. To begin with, top overhauls must be very simple. Everything appears to be readily accessible, plugs, auxiliaries, etc. There are no tappet adjustments, etc., to be made, with their rather complicated rockers and camshaft, poppet valves and springs. These do give a certain amount of trouble, which sleeve valves eliminate. I am not trying to draw comparison with Rolls-Royce engines to which we owe so much.

In a major overhaul, although sleeves have to be treated with great care, I believe, I would say that the sleeve valve engine would be easier to work on, and a far smaller number of components have to be stripped down and reassembled. Some years ago Bristol's gave an illustrated comparison of a poppet valve engine and a sleeve valve type with all parts laid out and photographed, which greatly impressed me. Of course, the sleeve valve liquid-cooled motor with cylinder blocks is not quite so simple to strip down as an air-cooled radial, but the Sabre would seem to score heavily over, say, a 12 cylinder inverted vee motor with petrol injection. At the moment, so far as I know, the Sabre has not the additional complication of two-stage, two-speed blower with intercooler.

Internal combustion engines are now reaching a very high state of efficiency and every improvement entails additional mechanical complication, which has been very capably handled by designers both from production and maintenance points of view. This race for high efficiency in aircraft engines has not yet reached the same peak as racing motor cycles and cars, which have given over 100 h.p. per litre quite regularly and with great reliability compared with the 50-odd h.p. of the modern aircraft engine. It is noticeable that the Sabre has motor racing in its blood, the short piston stroke and attendant high crankshaft revs. The shorter the stroke the lower the piston speed. High revs do not necessarily mean greater wear on parts, as has been proved by motor racing; in fact, the reverse is the case, low revs. have produced more wear, especially on cylinder bores. The 24 little "pots" of the Sabre will probably be made to give a great deal more power yet, and I can almost imagine the chagrin German technicians must have felt when analysing the Sabre (as they probably have by now).

N. V. BRITTAIN.

JET PROPULSION FOR AIRCRAFT

Gunpowder's Low Calorific Value

YOUR correspondent who suggests gunpowder as being superior to petroleum fuel for the jet propulsion of aircraft (*Flight*, March 16th) is evidently overlooking the very important matter of calorific value. Whereas petroleum fuel has a calorific value of approximately 20,000 B.T.U. per lb., the heat content of gunpowder is only about 1,325 B.T.U./lb., i.e., one-fifteenth that of petrol. (Even T.N.T., which I imagine could not be used in any case, has a calorific value of only 6,500 B.T.U./lb.—less than one-third that of petrol.) Thus, even though some energy is used for compressing the air to burn petrol, a jet-propelled aircraft using gunpowder would, I submit, have to carry at least ten times the weight of fuel to have the same range as one using petroleum fuel.

The explanation for the relatively low heat content of explosives is, of course, because they carry their own oxygen for combustion, whereas petrol, consisting entirely of hydrogen and carbon, obtains the necessary oxygen from the air and thus benefits by a form of continual flight refuelling free, gratis and for nothing.

A. R. OGSTON, F.Inst.Pet.

What Mr. C. G. Grey Said Years Ago

IN *Flight* of February 24th "Astro-Aeronaut's" reference to "the same age-old mistake . . . that propulsive effort is obtained by the action of the exhaust gases pushing upon the atmosphere" reminds me of some correspondence I had with Mr. C. G. Grey about nine years ago, in which he held that the recoil of a rifle was caused by the exploded gases pushing against the air after the bullet was shot out. I have avoided becoming involved with jet arguers ever since, but your correspondent "S. H.-A.," in *Flight* of March 10th, is really one too many.

Let us take a simple rocket consisting of a tube closed at one end in which fuel is burned very rapidly. The pressure against the closed end may be about 200 lb./sq. in., whereas there is no other end to be pressed. Apparently it must be pointed out that the gases once exhausted are not connected to anything, so that pressing with them against the air may be rather fun but quite superfluous expenditure.

How is the pressure against the closed end maintained? First, by the tube itself against which the pressure gradually falls along its length from 200 lb./sq. in. to 15 lb./sq. in. in air or zero in vacuum. Second, by the inertia of the burned gases which are being constantly accelerated towards the open

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end—slightly more so in the case of zero pressure at the open end. Would anybody have thought differently if left alone?

R. C. ABEL.

"Heath Robinson" Impellers of To-day

"PROJET'S" suggested modifications (*Flight*, March 23, 1944) and interesting possibilities for the future will require a lot more practical applications than mere equations and suggestions, and the present layout of the jet propulsion system would not convince the investor to finance it for its commercial future.

The apparent objection to the jet-propulsion system is the smaller mass of air it deals with per second as compared with an airscrew to obtain a given thrust. The incredible blower that "Projet" has his "doots" about is actually in existence, and was designed for the specific purpose of supplying air to the combustion chambers of the oil injection turbine, and for the combustion/steam turbine without a boiler plant; and if "Projet" is not hiding behind a bushel, I am willing to show him the results of our efforts.

It is to be particularly noted that the single and double winged impellers that are applied to blowers using components of well-known aircraft engines that are prevailing to-day and require very considerable h.p. to revolve them up to 28,000-30,000 r.p.m. are of very poor design and are particularly "Heath Robinson."

G. W. STANLEY.

BACKBONE OF THE FLEET

Three Objections Enumerated

IN your issue of March 23rd, your contributor, I. M. Leach, advocated a single-seat, multi-purpose naval aircraft.

As I see it, there are the following three objections to these Wyverns, as he chose to call them:

(1) Weight. Owing to the fairly short take-off run on an aircraft carrier, aircraft cannot be overloaded to the extent possible on land. Therefore, it will be seen that an aircraft with sufficient speed, armament, etc., for a successful fighter would be unable to take off with a torpedo or reasonably heavy load of bombs (not less than 1,000 lb.), and that an aircraft able to carry a torpedo or heavy load of bombs would be too slow and too lightly armed for a fighter.

(2) Armament. Even if the aircraft could be armed heavily enough for a fighter, it would still be almost defenceless against attack while carrying a torpedo or bombs, as all the armament would be fixed firing forward. I cannot imagine an aircraft with a 22in. torpedo or 2,000 lb. of bombs slung beneath the fuselage or wings manœuvring away from and on to the tails of attacking aircraft. Its speed would also be considerably reduced by the externally slung bombs or torpedo.

(3) Crew. Finally, there is the old objection that it is too much work for one man to act as pilot, gunner, bomb-aimer, navigator and wireless operator. I do not say that it is impossible, but it is a very great strain for one man to pilot, possibly through foul weather, navigate to some small moving target surrounded by miles of ocean, to fly through attacks by enemy fighters and flak, to make his attack, and then, with himself possibly wounded and his aircraft probably damaged, to pilot and navigate his aircraft back to his small, moving base.

If I may say so, I think that I. M. Leach has over-estimated the efficiency of the Wyvern, especially in the case of the torpedo-bomber. To hope that a single-seat aircraft could be a better torpedo-bomber than the Grumman Avenger which, in my opinion, is the best torpedo-bomber not on the secret list, is absolute folly

I think it might be possible to do with two aircraft types, and I would suggest the Seafire (fighter- (light) dive-bomber) and the Avenger (torpedo- (heavy) dive-bomber).

MICHAEL ANNAND.

Four-in-one Design Impracticable

ALTHOUGH neither an "outraged technician" nor an "exasperated pilot," I think that as "a man in the street" I am entitled to join in "the inevitable onslaught" expected by I. M. Leach about his article, "Backbone of the Fleet," published in *Flight*, March 23rd.

Perhaps he cannot see any *insurmountable* difficulties, but there are difficulties that are great enough to render the design and construction of the Wyvern, as he suggested, highly impracticable in wartime.

It should not prove difficult to combine fighter with dive-bomber (e.g., A-36 Invader), but to hang a torpedo on a small aircraft (small in order to preserve its quality as a fighter), flown by one man, and still have a torpedo-bomber superior to the Avenger or Barracuda seems well-nigh impossible for the present.

I. M. Leach categorised the duties of his proposed aircraft. Thus:

(i) Interceptor fighter
(ii) Dive-bomber
(iii) Torpedo-bomber
(iv) Escort fighter
} Wyvern

As I have previously stated, this is impracticable, but I do not see why two (or even three) of the aforementioned categories should not be combined. To give versatility they could be combined in several ways, thus:

(i) Interceptor fighter
(ii) Escort fighter
} Wyvern 1

(iii) Dive-bomber
(iv) Torpedo-bomber
} Wyvern 2

As Wyvern 1 need have no provision made for carrying anything but fuel (and, of course, armament, etc.), the all-round efficiency would be improved:

(i) Interceptor fighter—95 per cent. compared with Seafire;
(ii) Escort fighter—equal to Hellcat;

And as the size of the Wyvern 2 need not be restricted more than is necessary for operation from carriers, the torpedo(es) or bombs could be carried internally and *its* efficiency improved.

Another effective way of combining would be to preserve the interceptor fighter as a separate aircraft and combine the other three. The interceptor could then be 100 per cent. efficient and the dive-bomber-escort combination could still carry torpedo(es) and bombs internally. When used for escort work the bomb bay should provide excellent space for a big load of petrol.

After the war, and not until, suggestions can be tried, but now any interruption of the normal flow of aircraft would hamper the war effort, so let us concentrate on orthodox types.

R. E. GREGORY.

THE FLYING BOAT

Disposing of Some Generalities

HAVING perused with interest Mr. Pollitt's article "The Flying Boat," published in the February 24th issue of *Flight*, I am left with the feeling that the opinions are not quite as unprejudiced as the writer states, and also that generalities appear rather freely which are not substantiated by fact.

For instance, the statement that "only three forced landings were experienced by the *Lufthansa* in two *or* three years" conveys little information unless the number of actual crossings per annum are known. Mr. Pollitt then proceeds with his argument against the boat by a further reference to "bombers specially equipped for long sea crossings" of which we must presume that an alarming number must have been forced down into the sea for reasons not stated, since "many had to be abandoned and sunk by gunfire."

Now either these two facts entirely conflict, or else the bombers must have been forced down by enemy action. If the former is correct then forced landings are a possibility that must be catered for; if the latter—nothing further can be said.

Mr. Pollitt, however, somehow manages to draw a moral from this, which must be based on some very profound reasoning, for after stating that the aircraft were fitted with special flotation gear, which presumably kept the aircraft afloat after the fuselage was stove in, he goes on to deduce that a heavy sea might tear out the bottom of a hull and cause fatalities, but hints that this would not be so when a landplane is ditched, because it does not founder.

This surely is hardly an unbiased view, or else Mr. Pollitt has overlooked certain essential points—the main one is that the aircraft to be considered are civil types of the future and that whereas the civil landplane will not have the greatly strengthened floor structure that the bomber must have, the civil boat will be equally as strong as its military counterpart, and this, in any case, must be considerably stronger than that of any land machine.

I submit that where fit R.A.F. personnel fully trained by ditching drill may survive when a landplane is ditched at sea, passengers almost certainly will not, and that no flotation gear will be of consequence as regards life saving if a bottom be stove in. Digressing for a moment from Mr. Pollitt's argument, this matter of bottom strength is not an unimportant

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factor when the case of a forced landing *upon land* is considered.

However, if flotation gear is of value it can just as easily be fitted to a boat as to a landplane. The writer is under the impression that watertight sections of wing tips are a landplane requirement which can be applied equally to either type of machine.

A later reference with regard to sponsons on an amphibian is also rather mysterious, since by direct reference to Mr. Pollitt's diagram it is obvious that the arm "OA" remains constant whatever the fore and aft position of the sponson may be, the yawing moment being unchanged. Furthermore, the farther aft the sponson is moved the less becomes the maximum effective angle of yaw to bring point "B" directly behind point "C." The remarks regarding lateral stability are also, I think, somewhat misleading, since during a boat take-off, as the aircraft gathers speed its negative metacentric height decreases gradually until at the actual instant of take-off it has at least as great a positive metacentric height as a high-wing landplane.

At the instant the boat wings level up during the run, wing float support ceases to be necessary; this does not mean that a float cannot continue to function if the need arises. A much more critical case, however, is that when the landing problem is considered.

When due to low speed the ailerons become less effective, the conditions on approach to land surely favour the boat. When landing on a runway with cross-wind the righting moment from "one wheel touch-down" could be insufficient, in a bad case, to prevent the machine from at least damaging, if not wiping off a wing by impact with the ground. The flying boat, however, is automatically prevented from this by the presence of the wing-tip float, provided for this specific purpose; be it noted also that the boat may *not* be forced to land cross wind. In any case, why not ask a pilot who lands both types which he prefers to land in a cross wind!

Short and Harland. W. H. HAMBROOK,
Assistant Chief Designer.

DRIFT UNDERCARRIAGES

Three Possible Disadvantages

YOUR article about drift undercarriages in the issue of *Flight* dated March 16th was most interesting, and has provoked much discussion: may we have many more such original ideas!

In addition to the cost of airport space and runway space mentioned in the article, a factor of increasing importance for post-war airports is the cost of installing and running airfield lighting, radio aids to landing, etc. These facilities are likely to expand and become more complicated, and in the case of airfields with more than one runway, will presumably have to be available for each runway: for diversions to other airports will be undesirable, and passengers' safety will demand all possible precautions.

Furthermore, the more complicated the facilities for landing, the longer it will take to change runways when the wind changes. This will be very important for a busy airport, with aircraft running as closely to time as possible. The case for single runway airfields is therefore overwhelming.

The drift undercarriage, as I understand it, would appear to have three disadvantages. In a high wind the velocity gradient of the wind is steep close to the ground, and drift estimated at a few hundred feet is likely to be very wrong close to the ground. The tendency to weathercock after touch-down would also be a difficulty.

Secondly, it could not be used on take-off, when the effect of wind on the aircraft varies considerably with the speed of the aircraft. Though a cross wind on take-off is less serious than on landing, a single-runway airport would be liable to 90-degree cross-winds of 30 m.p.h. or more, which would be a strain on the undercarriage and a danger even on take-off.

Thirdly, how is drift to be estimated in conditions of low cloud or fog, when the ground can only be seen a short time before touch-down?

A solution to all these problems would be to have wheels free to move relative to the aircraft, but fixed in a given direction by a gyro. This would require some inventive skill, but tougher nuts than this have been cracked by inventors. The wheels would behave as do modern gyro-controlled compasses, and, if adequate power were supplied to the restoring couple which keeps the wheels straight, should be quite as sensitive as a compass. The wheels might even be remotely controlled by existing compasses in which case they could be set by setting a dial to the magnetic bearing of the runway. The extra weight of the undercarriage would be offset by the smaller need to strengthen the undercarriage legs against shearing stresses. I should be glad to hear the opinions of other readers on this matter. "OPTIMIST."

MAN-POWER FOR THE MAMMOTHS

Size Does Not Affect Handling

IT is always difficult to argue with a pseudonym, because one knows nothing of his experience, his character or the many other things which enable one to assess the value of a man's opinion. Perhaps that is why people use them.

But certainly the article published in *Flight*, March 30th, entitled "Man-power for the Mammoths," by "Indicator," is so full of stupid and inaccurate assertions about pilots that, as an airline captain serving in our major air line, I feel bound to refute some of them.

First, size has nothing to do with ease of handling of an aircraft. The Boeing 314 of 42 tons is easier to fly than a Sunderland of 26 tons, and a Sunderland is easier to fly than the Catalina of 16 tons. Similarly, for various technical reasons, the Hudson is trickier to fly than the Liberator.

It is nonsense to suggest that the men who have been flying on our air lines, some for the last 25 years, would not be able to handle aircraft of any size or shape. The Americans have had no trouble with their "Mars" and B-19—or are we supposed to be less efficient than the Americans?

Accepting the fact that landing and take-off are but a small part of the airline pilot's job, it is nonsensical to assert that merely because a junior pilot can do a smooth landing and take-off, he is necessarily more capable of performing the whole function of an airline pilot.

To assume this is to refute a principle which is generally held to be valid; namely, that experience at any job usually means increased proficiency. Why does one keep a log book, otherwise?

Would "Indicator" really prefer to fly round the world with a 400-hour bomber pilot who could do nice landings than with an O.P. Jones?

It is regrettable that in all methods of transportation there will always be accidents. But it is unwise to focus too much attention on these; they must be considered in the overall record of operation.

The average age of an airline pilot in this country is about 35. He is neither the "youngish experienced commander who may have dash to attempt the too difficult once too often" nor "the more elderly type of man; still hale and hearty, like the captains of ships, whose final nicety of judgment is not as good as the younger man." He is a well-balanced man with a great sense of responsibility, who has done from 5,000-18,000 hours' flying, who knows his job thoroughly, and can be relied upon to deal with any conditions which may be found in the world to-day or to-morrow. Otherwise, he wouldn't be alive.

It generally happens that at least once in a year during one's flying life one comes up against a situation which requires all the knowledge and skill that one has acquired to overcome it successfully. Airline pilots have been up against this thing for a long time. They don't require a board of psychiatrists to pass them out as fit to deal with an emergency. They have already dealt with scores, and will go on dealing with them as long as aircraft fly.

Space forbids much further discussion, but one sentence must not go unchallenged. The libellous description of the "somewhat airy individual who had, at least until the start of this war, tended to be in the majority of those who took up flying as a profession."

It is difficult to know who "Indicator" has in mind.

Perhaps Air Vice-Marshal D. C. T. Bennett or Lt. Cdr. Esmonde, V.C., or the pioneers who inaugurated the flying boat route to Australia and South Africa, and then flew the same aircraft across the Atlantic? Or the pilots who flew into Malta in the middle of the blitz with no guns? Or the pilots who have flown the North Atlantic for the last three years in all seasons? Or the keen lad in the R.A.F. who spent his nights swotting to get his second-class navigator's certificate and sometimes a first-class one just so that he could get into civil aviation? Or the—but one could go on indefinitely. Are these the "airy individuals"?

When the history of the world's airlines can be told in full, I hope that "Indicator" will study it. Perhaps then he may have more confidence in and a better appreciation of the men who have been mainly responsible for the position which air transport now occupies in the annals of enterprise and achievement. D. A. BRICE.

Russian Ground Crews

Backbone of the Soviet Air Force
Maintenance Work on Advanced Airfields

ACROSS the whole breadth of the Eastern front, the Russian Air Force is doing yeoman work. But this effort would have been shortlived were it not sustained by the efforts of the Russian ground crews.

For, if variety has been described as the spice of life, the dictum does not apply to the Russian "sprog."

Consider the scenes of operations: from the

Armourers filling machine gun belts.

Check up for altitude. A mechanic inspects the pilot's oxygen mask in the cockpit of a DB-3F.

(Above) Refuelling the DB-3F, the first Russian bomber to raid Berlin. (Left) Hoisting an airscrew into position on a TB-7.

(Above) Inspection of the DB-3f completed. The machine is powered with twin-row 1,100 h.p. engines and has a range of about 2,500 miles. (Left) Preparing flares for night raiding. (Right) Dorsal turret on the TB-7

mountain patches perched under the summits of the Caucasus to the Carpathians across expanses of rough steppe, merciless to the slightest carelessness in take off or landing, airfields are improvised in forest clearances or swampy country.

The ruthless winter presents problems which must be overcome by the advancing air force.

On the central sector snowed-up airfields and temperatures at which a touch of a bare hand bonds skin to metal are experienced. Further north the ground crews face the even more severe polar conditions.

With the arrival of spring, the snow-covered fields turn into a thawing ocean of slush, and with its gradual disappearance the black earth emerges soft and soggy as latex. The autumn again transforms the flat land into an expanse of mud and water, bogging man and machine. Such is the complete cycle.

The tasks of the ground crews, carried out under such conditions is a feat in the best tradition of military achievement.

(Above) The cannon tail turret on the TB-7 bomber. Other cannon-armed turrets are fitted behind each of the inboard engines. (Left) Adjusting the trimming tabs.

Where Battles are Won

The Post-war Responsibility of the Aircraft Industry

By R. D. LEAKEY

GENERAL MONTGOMERY, in his book, "Use of Air Power," makes the very significant statement that the battle of the air must be won before any battles on sea or land are begun. This means in effect that the Royal Air Force has become Britain's most important fighting Service, on which the whole success or failure of war depends.

To appreciate how this affects the aircraft industry we must consider what it is that determines the success or failure of battles in the air. In the "Battle of Britain" the odds against us were ten to one, and yet we came out victors. To say that this was entirely due to the famous "Few" is, with all due respect to them, a slight misrepresentation of the facts. If, instead of having Spitfires and Hurricanes in that battle, our equipment had been Bulldogs or Furies, I think everyone will agree that the result would have been just one more defeat for us.

IN this controversial article our contributor advances the view that in the next war it will be the aircraft industry which will decide the issue, and that it is upon the tools available rather than on the men who use them that success or failure depend.

The effect of the technical superiority of our fighters over the German equipment at that time is well known. But what is perhaps not fully realised yet is just how important the quality of the fighting tool is in modern war. The morale of the pilot, for instance, with the better machine is bound to be higher than that of his enemy who knows what he is up against. The Germans, I believe, took great pains to conceal their true casualties in the "Battle of Britain" for just this reason.

Machine-operator Fighter

But this is not the only effect of better equipment. The man using the more advanced fighting weapons such as aircraft is playing a rôle that is approaching more to that of a machine operator rather than that of a fighter, in the way the Commando is a fighter, for instance. He can only fight his machine within the limits for which it was designed, and no amount of courage or skill on his part will increase its speed, fire power or other decisive fighting qualities. The best pilots, I believe, are those who can keep cool and calculating minds, minds that are continually working with the same mechanical precision as their machines; such old-time fighting assets as excessive bravery, blind courage and so on, may now be more of a danger. A brave pilot might fight his battle till his petrol was exhausted, or engage superior machines against which he stood little chance of success. Circumstances might be such that his loss would lower the morale of his own side. In modern mobile warfare, a planned retreat may become more than ever a tactical move for victory.

To explain the point more clearly, one might say that modern war is like mechanical production of commodities. In industry, machines weave the cloth, cut the metal and do the actual work, while man's rôle has become that of servant to the machine, to keep it running. So in war, machines—shells, guns, aircraft, bombs—do the killing, while man's rôle is that of their operator. The mine, torpedo and shell are all weapons that do the work of killing with only remote guidance by man. As weapons develop, we shall probably have bombers and fighters without crews—worked by radio—for the tendency seems to be towards annihilating the enemy from ever greater distances.

One result of this is that the men who now take the real responsibility for the country's success or failure in war are no longer the products of institutions like Dartmouth, Cranwell or Sandhurst, but the designers, draughtsmen and other technicians in the engineering industry. The credit for success in future battles will go first to people like Sydney Camm and R. J. Mitchell, and only secondly to the Montgomeries and the Tedders. Factories such as Vickers and Hawkers will claim the first credit for the victories, much as regiments have done in the past, and the defeats will reflect back on the makers of the weapons used rather than on the men who serve them in battle.

But the most significant effect will be that war will begin long before the politicians have decided who the enemy or allies are to be. The most important part of the fighting will take place in the design offices and works of the weapon-making industries, which must utilise the peace to strive for technical superiority, for only on this will future wars be won. One might perhaps even say with truth that the "Battle of Britain" was won in the drawing-offices and works of Supermarine's and Hawker's in the years before the war started!

All this, if appreciated as it should be, is not going to allow the aircraft industry (or at least its design side) to sink back for a rest after its efforts in this war. So long as there is a danger of war on the horizon, the aircraft industry must be continually fighting for technical superiority. This will mean that our ridiculously inadequate engineering colleges will have to be swollen to the dimensions of Sandhurst or Cranwell.

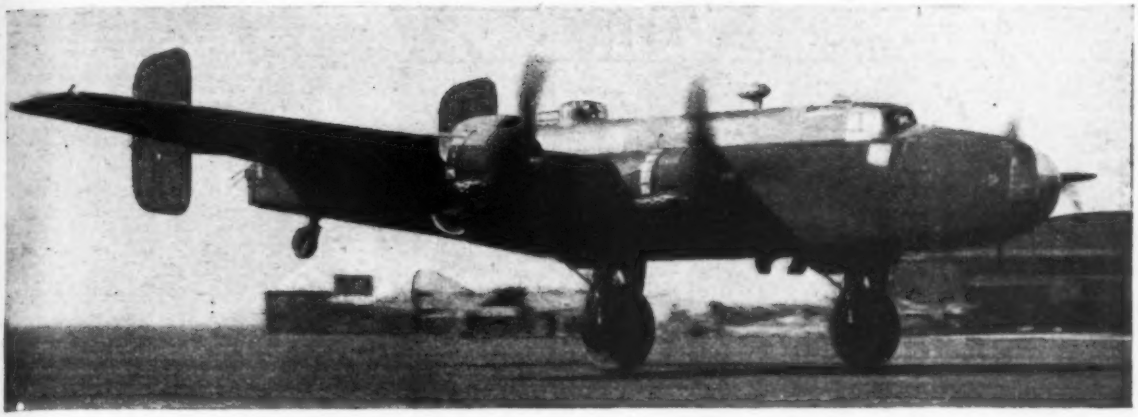
Because the hall-mark of good engineering is the ease with which its products can be used, aircraft of the future will not need nearly such trained crews to fly them, and what crews (if any) they do need will probably be engineers first and foremost.

Training engineers takes many years longer than teaching people to use the things they manufacture, and one has only to consider the skill required by makers of cars, and the time it takes to learn to drive, to appreciate this. In order to fight this peacetime war, therefore, we must have a large standing army of "backroom boys," or trained engineers, in addition to soldiers and pilots.

Secret Industry

The aircraft factories themselves will have to undergo a change. Some of them will have to remain little short of secret arsenals, with no commercial interests through which potential enemies might gain access to their secrets. Furthermore, since they are likely to be the first targets in another war, as will be the homes of their employees, their layout and location will have to be altered in case (as in Germany now) the anti-bomber defences become inadequate. I suppose that to be doubly safe, the aircraft industry and its supporting population had better be buried beneath the earth in case we should happen again to lose the first round in the next war.

All this talk of the next war must, I know, sound foolish when we still have a long way to go in this one. But when the peace comes, the aircraft industry will have to carry this heavy responsibility of the nation's security if other wars are going to occur. That there will be other wars may, of course, be a point of doubt. But since war seems to be the only effective cure for unemployment that man has practised, it is hardly likely that we are going to change our ideas, scrap our huge weapon-making industries, and accept this alternative instead. Or are we?



JUST AIRBORNE : A Halifax III at the moment of leaving the runway.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

Appointments

THE REV. J. A. JAGOE, M.A., K.H.C., to be Chaplain-in-Chief to the Royal Air Force, with effect from April 10th, 1944, in succession to the Rev. M. H. Edwards, O.B.E., B.A., K.H.C., who retired from the R.A.F. on that date.

ACT. AIR VICE-MARSHAL C. E. W. LOCKYER has been appointed Air Officer Commanding a Flying Training Group.

At the outbreak of war Air Vice-Marshal Lockyer was Deputy Director of Training at the Air Ministry. In April, 1941, he became Deputy Director of Research and Development of Equipment and Installations at the Ministry of Aircraft Production. In the following October he went to Washington with the R.A.F. Delegation for liaison duties. He was appointed Air Officer Commanding a Flying Training Group in September last year, and the new appointment is in the same Command.

Air Vice-Marshal Lockyer was formerly in the Royal Field Artillery, but transferred to the Royal Flying Corps in 1917. He was mentioned in despatches while serving in France in 1916 and again while serving with the Royal Air Force in Egypt, 1919. In 1925 he was awarded the J. B. Seely prize at Cambridge University for aeronautics.

Promotions

GENERAL DUTIES BRANCH.

Air Vice-Marshals (temp.) are granted the rank of Air Commodores (war substn.).

E. A. B. RICE, C.B., C.B.E., M.C., February 24th, 1944.

R. HARRISON, C.B.E., D.F.C., A.F.C., February 27th, 1944.

Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy :—

Bar to Distinguished Flying Cross

Act. Flt. Lt. S. R. GREEN, D.F.C., R.A.F.V.R., No. 35 Sqn.—This officer is an outstanding navigator who has completed numerous operations, many of them in a most important role. The reliability of his navigation and his keenness to press home his attacks have been worthy of the highest praise. Since the award of the D.F.C he has completed a number of sorties over heavily defended targets, including four attacks on Hamburg.

Act. Flt. Lt. M. J. RYAN, D.F.C., R.A.A.F., No. 156 Sqn.—Flt. Lt. Ryan is a very gallant and devoted captain of aircraft. Since the award of the D.F.C. he has taken part in a number of operational missions and has completed duties of a responsible nature. He has piloted his aircraft with precision to most difficult targets, and both in the air and on the ground his untiring efforts have been worthy of high commendation.

Act. Flt. Lt. P. A. STEVENS, D.F.C., R.A.A.F., No. 156 Sqn.—Since the award of the D.F.C., this officer has continued to display exceptional courage and coolness, skilfully overcoming intense opposition and guiding the attacks of his aircraft fearlessly and accurately. His outstanding efficiency as a navigator has been highly commendable.

F/O. T. E. DODWELL, D.F.C., R.A.F.V.R.—This officer has taken part in numerous operational missions, many of them being completed in the face of the most intense enemy opposition. Since the award of the D.F.C. he has completed many flights penetrating deeply into enemy territory. This officer has always shown great keenness and ability in all his duties.

Distinguished Flying Cross

F/O. W. R. P. PERRY, R.A.F.V.R., No. 106 Sqn.
F/O. A. E. THOMAS, R.A.F., No. 51 Sqn.
F/O. H. J. THOMAS, R.A.F.V.R., No. 235 Sqn.
F/O. E. L. WHEELWEIGHT, R.A.F.V.R., No. 101 Sqn.
F/O. R. L. WOOLDRIDGE, R.A.F.V.R., No. 149 Sqn.
P/O. E. L. L. ROWE, R.C.A.F., No. 415 (R.C.A.F.) Sqn.
P/O. J. YOUNG, R.A.F.V.R., No. 404 (R.C.A.F.) Sqn.

Air Chief Marshal Sir Trafford Leigh Mallory, C. in C. A.E.A.F., presenting the D.F.C. to a Norwegian captain who has four enemy aircraft to his credit and has taken part in 184 operational sorties.

W/O. M. J. CULLEN, R.A.F.V.R., No. 86 Sqn.
F/O. J. FORSYTH, R.A.A.F., No. 106 Sqn.
F/O. T. M. MITCHELL, R.C.A.F., No. 139 Sqn.
F/O. J. E. C. RADCLIFFE, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
P/O. E. E. AMERASEKERA, R.A.F.V.R., No. 158 Sqn.
P/O. J. R. BLOTT, R.A.F.V.R., No. 50 Sqn.
P/O. C. M. COUTLEE, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
P/O. J. L. HILLS, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
P/O. W. H. HOLDEN, R.A.F., No. 158 Sqn.
P/O. D. L. HOWELL, R.A.F.V.R., No. 218 Sqn.
P/O. J. P. HUTCHINSON, R.A.A.F., No. 626 Sqn.
P/O. H. E. JONES, R.A.F.V.R., No. 156 Sqn.
P/O. J. B. KING, R.A.F.V.R., No. 57 Sqn.
P/O. J. T. RASHBROOK, R.A.F.V.R., No. 78 Sqn.
P/O. R. J. E. MARTIN, R.A.F.V.R., No. 10 Sqn.
P/O. A. E. A MATTHEWS, R.A.F.V.R., No. 630 Sqn.
P/O. D. W. MCCONNELL, R.A.F.V.R., No. 101 Sqn.
P/O. J. MCINTOSH, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
P/O. K. MOUNTNEY, R.A.F.V.R., No. 102 Sqn.
P/O. D. R. OLIVER, R.A.F.V.R., No. 626 Sqn.
P/O. A. C. SMYTHE, R.A.F.V.R., No 44 Sqn.
P/O. G. A. SPARK, R.A.F.V.R., No. 625 Sqn.
P/O. J. R. WORTHINGTON, R.A.F.V.R., No. 630 Sqn.

THE KING has been graciously pleased to approve the following award with effect from January 5th, 1944, in recognition of gallantry displayed in flying operations against the enemy in New Guinea :—

Distinguished Flying Cross

F/O. R. H. FINLAY.

Roll of Honour

Casualty Communiqué No. 369.

The Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 124 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Lt. H. C. S. Armstrong, D.F.C.; Sgt. F. Byrne; Sgt. J. M. Cantor; Flt. Sgt. F. T. Copp; F/O. H. R. Davis; Flt. Lt. M. L. Gillingham; Sgt. J. Hall; Sgt. C. J. Lowther; Sgt. J. McKenzie; Sgt. D. W. Munson; Sgt. J. E. Parsons; F/O. M. V. Wareing.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. D. B. Ackerley; Sgt. J. E. Burgess; Sgt. P. A. Chapman; Sgt. W. Collins; Sgt. R. H. Cookson; F/O. G. Downey; Sgt. A. E. Garlick; Sgt. D. B. Gordon; Flt. Sgt. R. G. Jenkins; Sgt. W. McConnell; Sgt. J. Peck; W/O. E. G. Pointer, D.F.M.; Sgt. T. P. Russell; Sgt. L. L. Seal.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. W. Antcliffe; Sgt. D. Armitage; P/O. A. Armstrong; Sgt. C. W. Astle; Sgt. S. F. Barrow; Sgt. R. S. Blake; Sgt. G. V. Branson; Sgt. E. Broadhead; Sgt. R.

SERVICE AVIATION

ardman; Sgt. R. C. H. Brand; Sgt. W. H. Bryant; Sgt. A. S. Bushill; Sgt. N. A. M. Cawthpa; F/O. C. K. Cazaly; Sgt. L. M. Chianall; P/O. R. Christy; Sgt. W. R. L. Codd; Sgt. E. G. Collman; Sgt. G. W. Colyer; Sgt. L. F. Cook; Sgt. A. S. Cousins; Sgt. W. H. Cox; P/O. G. Cribbin; Sgt. C. H. G. Daft; Sgt. G. T. Davies; Sgt. W. Denham; Sgt. G. N. Downing; Sgt. A. Drury; Sgt. C. N. Enright; Sgt. R. G. Foot; Sgt. W. J. Ford; Sgt. G. M. Galbraith; P/O. A. E. Gale; Sgt. P. Gee; Sgt. L. G. Hadden; Sgt. E. D. Hart; F/O. D. Harvey; Flt. Lt. G. F. Hogg; Sgt. F. Holmes; Sgt. A. J. Horne; Sgt. H. W. E. Hyett; Sgt. S. Jones; Sgt. B. McM. Jubb; Sgt. M. Kendlan; Sgt. J. Kershaw; Sgt. D. E. Killick; F/O. F. King; F/O. R. Kirby; Sgt. W. C. Langley; Act. Sqn. Ldr. R. H. Laud; Sgt. J. F. B. Lester; Sgt. R. L. Lewis; F/O. L. C. Long; Sgt. R. Lowe; Sgt. T. R. Lunn; Sgt. I. Macrae; F/O. J. M. Marnoch; P/O. O. P. Marshall; Sgt. J. M. Meech; Sgt. G. J. Mitchener; Sgt. J. Monteith; Sgt. T. Morris; Sgt. H. S. Mulholland; Sgt. F. Needham; Sgt. R. S. Naile; Sgt. D. P. O'Riordan; Sgt. N. A. J. Pearce; Sgt. G. T. Pine-Coffin; Sgt. F. H. E. Pooley; Sgt. T. Price; Sgt. W. B. Rawnsley; F/O. N. S. M. Reid; Sgt. J. W. Richardson; Sgt. R. W. Rivers; Sgt. H. S. Scott; Sgt. H. Squire; Sgt. B. H. Stephenson; Sgt. A. H. Taylor; Sgt. J. C. Thomas; Sgt. G. C. Thompson; P/O. D. T. Tonkinson; P/O. N. B. Touzel; Sgt. C. A. Warnes; Sgt. J. H. Waterston; Sgt. J. G. Watkins; Sgt. S. J. Wayman; Sgt. C. F. S. Wells; Sgt. D. L. Williams; Sgt. F. A. Williams; Sgt. G. H. Williams; F/O. H. S. Winchester; Sgt. L. A. Wright.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. J. D. Ashton; Act. Sgt. C. S. Hobbs; W/O. J. B. Richardson; F/O. J. G. Trull; Flt. Sgt. J. M. S. Walley; Flt. Sgt. W. B. Ward; Sgt. L. R. Wilkins; Flt. Sgt. R. Yates.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. G. Channon; Sgt. C. R. Greenwood.

PREVIOUSLY REPORTED MISSING, NOW REPORTED DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. G. E. Davies.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. A. K. Cowie; Sgt. R. H. Easton; Flt. Sgt. R. K. Y. Fairbairn; F/O. R. N. Foster; F/O. D. A. L. Hall; F/O. D. R. Inskip; Flt. Lt. S. J. Lovell.

MISSING.—F/O. H. R. Adams; Sgt. L. S. J. Adkin; Act. Sqn. Ldr. B. G. Aston; Sgt. L. J. Barnes; Sgt. J. E. Beattie; Sgt. S. Begg; Flt. Sgt. G. W. Box; Act. Flt. Lt. G. K. Boyd, D.F.C.; Sgt. T. Campbell; P/O. R. Cass; Act. W/O. J. A. Crabtree; Sgt. R. C. Crockett; Sgt. H. Crowe; P/O. S. Daggett; Sgt. R. T. Davies; P/O. W. R. Dishman; Sgt. J. Dowding; Sgt. G. S. Ellis; Flt. Lt. P. S. A. Fielding F/O. D. A. V. I. D. Finlay; Sgt. R. C. H. Fisher; Sgt. J. B. Foster; Act. Flt. Sgt. J. B. Gilbertson; Flt. Lt. W. H. Gilliland; Sgt. F. Habbershaw; Sgt. F. Helm; Flt. Sgt. H. I. Highfield; Sgt. P. Horsefield; Flt. Sgt. F. N. Jungalwalla; Flt. Lt. D. M. Leith-Hay-Clark; Flt. Sgt. D. F. Ling; Sgt. T. K. McCash; Sgt. D. McDonnell; Flt. Sgt. J. J. Martin; Flt. Sgt. P. D. Martindale; Flt. Sgt. J. R. Maycock; Sgt. R. A. D. Mirams; Sgt. A. Nicholson; Flt. Sgt. G. A. Orchard; F/O. R. M. Parker; Sgt. F. K. Piggott; Sgt. A. B. Porter; W/O. J. Pritchard; Sgt. A. Pulman; F/O. M. O. Rees; Flt. Sgt. L. D. Richards; Flt. Lt. A. H. J. Sambridge; Sgt. M. G. Savery; Sgt. G. Silverwood; Sgt. J. C. Smith; F/O. T. A. Stanton; Sgt. E. Starkie; Flt. Sgt. J. J. Taylor; F/O. J. J. M. Taylor; Sgt. R. F. A. Watson; Sgt. P. W. Webb; Sgt. J. J. Whelan; P/O. T. E. Wilkins.

KILLED ON ACTIVE SERVICE.—Sgt. R. H. Appleton; Sgt. D. A. Backhouse; Sgt. J. R. Ballantyne; F/O. C. W. Binnie; Sqn. Ldr. A. Black; Sgt. A. E. W. Budden; Sgt. R. E. Duke; Sgt. A. C. Fisher; Flt. Sgt. J. B. Gibbs; Sgt. H. W. E. Gleed; Act. Flt. Lt. J. M. Greig, D.F.C.; Sgt. D. L. Helsby; L.A/C. A. G. Higgins; W/O. J. K. Houston; Sgt. K. Huggins; F/O. G. H. Jackson; Sgt. G. M. Jones; Act. Cpl. F. W. Jones; F/O. W. J. King; Sgt. K. R. Lewis; Sgt. L. W. C. Low; F/O. C. Lumby; W/O. J. B. McKnight; Sgt. H. Nelson; A/C.2 S. Nutter; Flt. Sgt. F. G. O'Malley; Sgt. C. J. Pascoe; Sgt. R. Pratt-Robinson; Flt. Sgt. A. Settle; Sgt. A. Spence; Sgt. G. Turner; Sgt. S. Walker; F/O. J. Waring; W/O. J. A. Webb; Flt. Sgt. J. H. Whalley; Sgt. K. N. Whitnall; L.A/C. W. H. Williamson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. C. P. Ellis; Sgt. J. K. Fulton; L.A/C. B. F. Garrad; F/O. J. R. May; Sgt. H. R. Simmonds; L.A/C. F. A. Webb; P/O. P. S. Wright.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—W/O. A. S. Arnold; Sgt. S. G. Pryke.

DIED ON ACTIVE SERVICE.—L.A/C. R. Pegg.

PREVIOUSLY REPORTED PRISONER OF WAR, NOW REPORTED DIED ON ACTIVE SERVICE.—P/O. A. A. Toller.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. G. McK. Milne.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A/CW. E. G McKeith; A/CW.2 M. Montgomery.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. R. A. Byass.

MISSING, BELIEVED KILLED IN ACTION.—F/O. W. K. Hutton; F/O. R. E. Walker.

MISSING.—Flt. Sgt. K. R. J. Bradbury; Act. Flt. Lt. N. W. Kilsby; Flt. Sgt. J. C. Lyster; Sgt. D. K. Milne; P/O. D. F. Shipley; Flt. Sgt. J. R. Tree.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. C. D. Jones; Flt. Sgt. K. A. Wilson.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—W/O. A. E. Taylor.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Sgt. F. G. Green; W/O. W. G. King; Flt. Sgt. D. G. McLeod; Sgt. G. Martin; Sgt. A. L. Mullen; Sgt. R. H. Rahn; Flt. Sgt. L. Riggs

WOUNDED OR INJURED IN ACTION.—W/O. A. L. Weaver.

KILLED ON ACTIVE SERVICE.—F/O. H. A. Baker; Sgt. J. L. Barber; Sgt. J. H. Casselman; Sgt. E. E. Cowie; Sgt. D. D. Finch; F/O. M. L. Jones; F/O. D. S. Kerr; F/O. J. C. Laidlaw; P/O. D. MacNeil; Sgt. E. H. D. Maguire; Sgt. H. L. Mein; Flt. Sgt. P. J. Power; P/O. J. G. Siebens; Sgt. J. M. Stephens; Sgt. W. R. Stone; Flt. Sgt. J. L. Tennyson; F/O. H. G. Trueman; Sgt. W. R. Waldron; Sgt. H. D. Westley; Flt. Sgt. W. L. Wolf.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. W. J. N. Duggan.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. G. W. Strong.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. B. Cooksey; Act. Flt. Lt. G. I. Ellis; F/O. C. H. Riddle.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. C. A. Harrison.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. D. K. H. McDonald.

South African Air Force

MISSING.—2/Lt. J. D. Friend.

DIED ON ACTIVE SERVICE.—2/Lt. A. Stanton.

Casualty Communiqué No. 370

Of the names in this list 119 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—P/O. D. Affleck; F/O. J. F. Cutler; Sgt. S. B. Kennett; Sgt. W. G. Milne; Flt. Sgt. D. M. Price.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. R. W. H. Carter; F/O. J. D. Humphreys; Sgt. D. N. Law; Sgt. G. F. Locke; F/O. H. J. Lumb.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. B. C. Abrams; Sgt. R. Adair; Sgt. E. D. Ager; Sgt. E. H. F. Barker; Sgt. D. W. Bartholomew; Sgt. F. Bell; P/O. W. L. Binnington; Sgt. P. Blundell; Sgt. G. L. Bottomley; Act. Flt. Lt. C. C. J. Bowyer; Sgt. W. J. Brookes; Flt. Sgt. G. H. Brooks; Sgt. R. B. Butler; Flt. Sgt. F. W. Capes; Sgt. R. C. Child; Sgt. K. G. Chilver; F/O. J. Cookson; Flt. Sgt. J. R. L. Cooper; Sgt. P. M. Cosgrove; Flt. Sgt. D. E. T. Crosland; W/O. E. Dainty; Sgt. A. D. Dawson; Sgt. A. C. De; F/O. H. J. H. Debnam; Sgt. C. W. S. Downes; Sgt. H. A. Dunn; Sgt. W. Easson; P/O. W. Edmond; F/O. D. V. Elliott; Sgt. G. Elsworthy; Sgt. C. R. Fleming; Flt. Sgt. E. J. A. Ford; Sgt. T. R. Forster; Flt. Sgt. W. E. Freeman; Sgt. D. A. Genever; Sgt. H. J. Gibbs; Flt. Sgt. E. W. Goodheart; Flt. Sgt. T. Goulden; Sgt. R. C. Grant; Sgt. W. R. Green; Sgt. E. H. J. Groves; P/O. J. L. Haddow; Sgt. I. E. G. Hall; Flt. Sgt. H. Hay; F/O. W. C. Haycock; Sgt. W. F. Henderson; Flt. Sgt. J. C. Hesketh; Sgt. R. L. Howarth; F/O. G. F. Jones; Flt. Lt. J. D. Keynes; Sgt. G. A. King; Sgt. J. A. Kinnear; Flt. Sgt. A. N. Lancaster; Flt. Sgt. J. Lawson; Sgt. J. A. Lewis; Sgt. R. Lewis; Sgt. H. Lloyd; Sgt. C. W. H. Makin; F/O. W. A. Marsden; F/O. H. L. Martin; P/O. R. A. C. Maund; F/O. G. May; Sgt. R. Milbourne; Flt. Sgt. W. D. Mills; Sgt. J. D. Minton; Sgt. T. B. Morris; P/O. C. A. Nicholls; Sgt. T. C. L. Orchard; Sgt. A. L. Payne; F/O. A. H. Pelham-Clinton; Sgt. E. Prescott; Sgt. J. Quayle; Sgt. J. Richards; Sgt. C. A. Richardson; Flt. Sgt. J. A. J. Roff; Sgt. R. J. Sage; F/O. J. L. Seymour; P/O. J. Shepherd; P/O. F. B. Simon; P/O. P. Smailes; Sgt. D. C. Smith; F/O. A. D. Sommerville; Sgt. T. W. T. Stoddart; Sgt. D. G. A. Storey; Sgt. R. V. Street; Sgt. R. Wadsworth; Sgt. V. N. Walker; Sgt. D. H. Walshaw; Sgt. H. Ward; F/O. R. L. Wellington; Sgt. T. A. Wells; Sgt. L. R. Whatley; Sgt. H. J. K. Wheeler; F/O. H. E. Wilkinson; Act. Sqn. Ldr. R. S. Williams, D.F.C.

WOUNDED OR INJURED IN ACTION.—Sgt. A. F. Bartlett; Sgt. K. Franklin.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—P/O. J. T. Lyons, D.F.M.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. E. Pearce.

MISSING.—P/O. J. Adamson; Flt. Lt. S. H. Alcock; Sgt. F. G. Aldred; P/O. J. E. Alves; Sgt. R. Anderson; F/O. A. V. Beetch; Sgt. A. J. Belton; F/O. R. D. Betty; Sgt. G. Bone; Sgt. E. Brookes; Sgt. F. C. W. Bull; Sgt. S. Bullamore; Act. Flt. Lt. R. P. Burtt; Flt. Sgt. A. J. A. Chappel; Sgt. R. S. Chesters; Sgt. B. Clark; P/O. G. Clarke; Sgt. W. H. Clarke; Flt. Sgt. H. H. Craig; Sgt. O. D. Culverwell, D.F.M.; Sgt. D. Dart; Act. Flt. Lt. L. G. Davis; F/O. H. E. Daynes; Flt. Sgt. B. P. Dineen; Sgt. D. R. Edmands; Sgt. J. K. English; Flt. Sgt. W. G. Filer; Flt. Sgt. M. J. Fletcher; Sgt. F. W. Flower; Sgt. H. R. Gibbon; Sgt. W. R. Greenaway; Sgt. R. J. Grist; Flt. Lt. K. Harris; Sgt. E. P. Hillyard; P/O. F. Langley; Sgt. R. Latham; Sgt. W. H. Lyssington; Sgt. T. F. McLean; Flt. Sgt. D. N. Marsh; Flt. Lt. A. T. Martens; Sgt. D. Minor; W/O. V. G. Osterloh; Sgt. A. G. Palmer; Sgt. J. A. Parkman; Flt. Sgt. J. S. Poole; Sgt. W. L. Pritchard; Sgt. A. P. Readdy; Sgt. F. E. Robson; Sgt. L. G. Sandilands; Flt. Lt. E. W. Sargent, D.F.C.; F/O. L. J. Slatter; Sgt. M. F. R. Sorton; Act. Flt. Lt. G. A. Spark; Sgt. W. Speakman; Sgt. R. Taylor; P/O. S. W. H.

An interior of the new Proctor IV which is employed as a radio trainer by both the R.A.F. and the Fleet Air Arm.

Taylor; Sgt. D. W. A. Udall; Sgt. W. Warburton; P/O. H. J. Watkins; F/O. R. A. West; Act. Flt. Lt. F. A. Whitehead; Sgt. J. H. Williams; Sgt R. Winder; P/O. A. O. Wright.

KILLED ON ACTIVE SERVICE.—Sgt. N. J. Allen; F/O. D. E. Blunt; Sgt. F. V. Brade; Sgt. A. L. T. Butler; F/O. G. W. C. Candlin, D.F.C., D.F.M.; W/O. A. H. H. Carter; Sgt. S. T. Dean; A/C.1 F. G. Denham; L.A/C. T. Dunn; Sgt. W. Ellenor; Sgt. E. L. Flemons; A/C.1 W. Hetherington; Sgt. H. Ingram; F/O. L. H. Jacobs, D.F.C.; Flt. Sgt. F. P. Jervis; W/O. H. A. W. Jolly; F/O. F. W. Jones; A/C.2 A. R. Kavanagh; Sgt. J. D. Kennedy; Sgt. R. J. King; Act. Sqn. Ldr. J. H. Kirton; Sgt. G. B. Lawson; Sgt. B. K. Mitra; Sgt. M. Mullins; A/C.1 S. N. Nott; F/O. P. O'Grady; Cpl. E. O'Shaughnessy; F/O. L. L. Oram; Sgt. J. Orr; Sgt. D. B. Palmer; Sgt. A. Peat; Sgt. G. Prentice; L.A/C. C. Redman; Sgt. W. Roy; Sgt. W. G. Stoneman; Flt. Sgt. I. Storr; Sgt. S. G. Tucker; L.A/C. L. A. C. Wallis; Flt. Sgt. K. S. Wilson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. J. H. B. Eyles; Sgt. W. Greenwood.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. R. E. Gill; Sgt. J. E. Plummer; Flt. Sgt. E. S. Smith; Sgt. D. E. Watts.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. D. G. Cooke; Flt. Sgt. A. Corlett; P/O. G. H. G. Harris; Sgt. L. A. Harbottle; Flt. Sgt. R. W. Meeking.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A/C. A. C. Preston.

PREVIOUSLY REPORTED MISSING, NOW PRISONER OF WAR.—Sgt. C. F. Dowlman; Flt. Sgt. A. J. Edwards.

Women's Auxiliary Air Force

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A/CW. D. M. Lewis; L.A/CW. J. F. Ramsay.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. C. Tate.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. I. W. Banks; Flt. Sgt. J. A. Brock; Flt. Sgt. F. W. G. Limbrick; Sgt. T. W. Page.

MISSING.—Flt. Sgt. R. A. Cook.

KILLED ON ACTIVE SERVICE.—F/O. G. G. Stobie.

Royal Canadian Air Force

KILLED IN ACTION.—P/O. J. W. B. Demers; Flt. Sgt. W. A. Stiles.

MISSING, BELIEVED KILLED IN ACTION.—P/O. J. G. Bennett; P/O. A. Brooks; F/O. J. A. C. Dixon; Flt. Sgt. C. W. Frauts; Sqn. Ldr. C. W. Smith; F/O. H. R. Wilson.

MISSING.—F/O. R. H. Adamson; F/O. A. D. G. Bell; F/O. T. K. Canning; Flt. Sgt. L. G. Carson; Flt. Sgt. J. M. Cassady; P/O. R. E. Countess; Flt. Sgt. L. W. Cuming; Sgt. C. N. Durdin; P/O. F. J. Elms; P/O. A. S. Gates; F/O. J. F. Harrigan; P/O. A. K. Heaton; Sgt. F. W. Heinen; F/O. J. Horn; P/O. A. W. Hornby; Flt. Sgt. M. Kwas; Act. Flt. Lt. E. E. Kearl; Flt. Sgt. J. King; Flt. Sgt. V. M. Lawson; Sqn. Ldr. L. M. Linnell; Flt. Sgt. J. A. MacLean; Flt. Sgt. J. F. McManus; P/O. E. D. Nesbitt; P/O. J. P. D. Parise; F/O. D. J. Paterson; W/O. L. H. Patterson; Sgt. D. L. Pocock; F/O. G. R. Presland; P/O. E. R. Proud; Flt. Sgt. C. A. Sherwood; F/O. D. M. Sim; Flt. Sgt. A. Smith; F/O. K. A. Solmundsson; Flt. Sgt. H. Suthers; F/O. J. D. Teskey; Flt. Sgt. T. A. Thomson; W/O. G. P. White; Sgt. P. F. Wicks; Flt. Sgt. R. P. Wilmott.

KILLED ON ACTIVE SERVICE.—W/O. L. T. Erickson; Sgt. M. H. Graham; Sgt. J. A. Jefferson; P/O. C. D. McKinley; Flt. Lt. R. F. McSorley; P/O. W. F. H. O'Beirne.

WOUNDED OR INJURED ON ACTIVE SERVICE.—P/O. R. H. Dillon; Flt. Sgt. A. C. Emerson; Sgt. H. B. Finlay; P/O. R. Godfrey.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. E. W. J. Collingwood; Act. Flt. Lt. J. C. Dillicar; F/O. W. V. Fitzgerald; P/O. A. W. Flack; Sgt. S. C. Orme; Flt. Sgt. F. W. Upton.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. C. H. Drumby.

Casualty Communiqué No. 371

Of the names in this list, 122 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. J. McReady; Sgt. H. Miller; F/O. G. F. G. Owen; Sgt. G. W. Smith.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. E. F. Daniel; Sgt. A. Glen; Flt. Sgt. J. T. W. Jones; Sgt. F. G. Lay-Flurrie; Sgt. R. G. Pope; Sgt. T. F. Potter; Sqn. Ldr. D. L. Wolfe, D.F.C.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. B. A. Abraham; Sgt. A. S. Andrews; Flt. Sgt. H. V. F. Archer; Sgt. B. A. Bacon; Sgt. J. Banyer; Sgt. A. Barrie; Sgt. L. P. J. Bellaby; Sgt. A. Bone; F/O. P. C. Bradley-Drayton; Sgt. E. Bradshaw; Sgt. G. Brady; Sgt. W. Bramwell; F/O. T. D. Brown; Sgt. H. W. Burton; Sqn. Ldr. W. W. Cave, D.F.C.; Sgt. E. C. Church; F/O. M. W. P. Clarke; Sgt. J. Cliffe; Sgt. R. E. Dadd; Sgt. D. J. Davies; Sgt. W. H. Davies; P/O. J. Denheim; Sgt. K. C. Eagland; Sgt. W. R. East; Sgt. H. R. Fink; Sgt. L. C. Fitt; Sgt. E. A. French; Sgt. D. Gillis; Sgt. J. Goulding; P/O. D. E. Grant; Sgt. G. A. A. Grant; Sgt. G. A. F. Green; Sgt. C. J. J. Hine; Sgt. R. L. Hollywood; Sgt. F. G. Hooper; Sgt. L. Horricks; Sgt. W. R. Howes; P/O. A. D. Johnson; Act. Sqn. Ldr. P. Johnston, D.F.C.; Sgt. L. Jones; Sgt. P. M. Jones; Sgt. W. G. Kirby; Sgt. D. Lenahan; Sgt. W. R. Louth; Sgt. F. McPhillips; Flt. Sgt. B. Millward; Sgt. W. Morton; P/O. W. R. Neville; Sgt. C. Newman; Sgt. W. E. H. Nicholls; P/O. T. G. Ogle; Sgt. S. Rogers; Sgt. R. Ronald; Sgt. D. Ruocco; Sgt. A. J. Sales; Act. Sqn. Ldr. P. R. Turgel, D.F.C.; P/O. J. E. Ulrich; Sgt. V. J. Upson; Sgt. H. Walters; Sgt. E. M. Whitsed; Flt. Sgt. R. F. Williams; Sgt. B. W. Wyatt; Act. Sqn. Ldr. J. K. Young.

MISSING.—P/O. J. Alexander; F/O. E. Anderson; Sgt. C. Atherton; Sgt. G. H. Barrington; Flt. Sgt. J. Begg; Sgt. J. R. Bothwell; Sgt. R. V. T. Bowerman; Sgt. T. Boyd; Flt. Lt. B. J. Brachi; F/O. R. S. H. Browning; Flt. Lt. N. Butler, D.F.C.; F/O. H. L. W. Cairns; Flt. Sgt. A. Campbell; Sgt. W. Cannon; F/O. E. J. L. Carpenter; Sgt. G. F. Carter; Flt. Sgt. K. W. Chalk; Sgt. W. Clark; Flt. Lt. E. S. Clarke; Flt. Sgt. C. Clifton; F/O. H. L. G. Dodson, D.F.M.; Sgt. V. Dooley; Flt. Sgt. G. Dove; Sgt. R. E. Drewett; Sgt. T. K. Dudley; Sgt. R. V. Fairley; Sgt. P. Fowler; Sgt. J. H. Gainsborough-Allen; Sgt. F. W. Gander; Sgt. S. J. Groucott; Sgt. K. L. Harding; Sgt. W. Harrison; Flt. Sgt. E. G. Hart; F/O. F. W. D. Haynes; Sgt. G. R. Holland; Sgt. H. Howson; F/O. J. D. Hughes; Flt. Sgt. E. H. Jacobs; Sgt. D. E. James; Sgt. F. Jarvis; Sgt. A. Johnston; Act. Sqn. Ldr. A. P. Jones; F/O. R. C. Langridge; Sgt. W. F. Hedingham; Sgt. D. H. Lockyer; Sgt. J. McIver; F/O. A. P. MacLeod; Flt. Sgt. A. Mayes; Flt. Sgt. G. T. Moody; Sgt. E. Moxen; Sgt. W. Newman; Sgt. P. H. Normanton; Sgt. A. S. O'Connor; Sgt. J. C. W. Olliffe; P/O. T. E. Ord; Sgt. W. R. Owen; Sgt. E. Parker; Sgt. J. H. Parrott; P/O. F. J. Peacock; Flt. Sgt. D. R. H. Rees; Flt. Sgt. F. P. Reilly; Sgt. E. C. Richards; Sgt. G. Ridley; Sgt. G. Royston; Sgt. L. G. Rush; Flt. Sgt. L. Sawle; Sgt. A. J. W. Saxty; Sgt. K. J. Scales; Sgt. J. P. Seddon; Sgt. D. L. Silverman; Sgt. J. F. Smith; Flt. Sgt. H. H. Streeting; Sgt. D. F. Taylor; Sgt. A. Thompson; Sgt. W. S. Travers; Sgt. J. W. Ward; F/O. C. B. Watt; Sgt. J. Watters; P/O. A. P. Willmott.

KILLED ON ACTIVE SERVICE.—Sgt. A. P. Bashforth; Flt. Sgt. S. Bright; Flt. Sgt. F. A. B. Brown; Flt. Sgt. G. W. Fretwell; Sgt. T. Harris; A/C.2 E. S. Hodgkins; Act. Flt. Lt. A. J. S. Hodson, D.F.C.; Flt. Sgt. J. D. Jones; F/O. P. G. Lee; Sgt. P. G. MacDonald; Sgt. J. Mawhinney; F/O. J. K. Meyler; Sgt. J. F. Nelson; Flt. Sgt. R. F. Savage; Sgt. K. Smith; W/O. J. E. Stephen; Sgt. H. D. Tomkins; Flt. Lt. A. B. Woods.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. R. A. J. Rogers.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. K. H. Green.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. E. Hopwood.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. S. J. Booker; Flt. Sgt. D. G. England.

DIED ON ACTIVE SERVICE.—Sgt. F. W. S. Cross; Sgt. E. Joseph; Sgt. R. F. R. Morgon; Cpl. W. C. Williams.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. R. Black; Sgt. J. Connolly; F/O. D. J. Gibson; Act. Flt. Lt. C. J. Longmore; Sgt. E. L. McVitie.

Royal Australian Air Force

KILLED IN ACTION.—W/O. D. Rogers.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. L. E. Cavanagh; Flt. Sgt. R. W. Maroney; P/O H. N. Peters; F/O. P. R. Quance; F/O. W. E. Riley.

Recently, R.A.F. and U.S.A.A.F. bomber crews exchanged visits to see each other's aircraft. Capt. A. H. Knox (left) is showing Flt. Lt. Jameson the cockpit of his Fortress.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—P/O. R. T. Andrews.

MISSING.—F/O. A. G. Archibald; Flt. Sgt. A. P. Brander; F/O. T. E. Charles; Flt. Sgt. L. H. Christmass; Flt. Lt. N. P. Cooper; P/O. J. D. Greenwood; F/O. W. H. Hewson; P/O. G. J. Kerr; F/O. N. C. Law; Flt. Sgt. K. R. Lindenburg; P/O. N. J. Lyford; Flt. Sgt. W. J. O'Donnell; P/O. C. G. Phelps; P/O. D. W. Story; Flt. Lt. R. P. Wishart.

KILLED ON ACTIVE SERVICE.—Sgt. M. Hogan; Flt. Sgt. W. C. Kinsman; P/O. W. G. Lupton.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. E. T. Bowe.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED PRISONER OF WAR.—Act. Sqn. Ldr. W. R. Matheson.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. D. G. Bebensee, D.F.M.; Sgt. R. C. Broadbent; W/O. D. L. G. Brown; P/O. C. E. Hightower; F/O. G. G. McGladrey, D.F.C.; Flt. Lt. R. G. Morrison, D.F.C.; W/O. W. Pearson; Sgt. W. G. Uttley; P/O. E. M. Witt.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. H. Dillon; P/O. T. H. N. Emerson; Flt. Sgt. G. E. Greenwood; Sgt. J. P. Keating; W/O. C. J. V. Kettley; Sgt. R. R. Law; Sgt. J. P. G. O'Reilly; P/O. M. S. Smyth; Flt. Lt. H. R. Sutton, D.F.C.; Flt. Sgt. J. V. Sweeney; Sgt. D. G. Tremblay; Flt. Sgt. E. K. White; Flt. Sgt. M. E. Zapfe.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. H. C. Clay; F/O. F. Forrest; F/O. W. G. Hicks; F/O. G. E. Lemerick; Flt. Sgt. J. A. L. Martel; Flt. Sgt. F. W. Palmer; Sgt. R. Tarbet.

MISSING.—Flt. Sgt. L. C. Bannister; P/O. H. J. Barrons; Sgt. E. A. Bell; F/O. R. O. Brown; F/O. W. A. Cook; W/O. E. A. Cornfield; F/O. R. C. Crompton; P/O. E. P. Devaney; Act. Flt. Lt. T. E. Dubroy; P/O. R. McI. Duncan; P/O. W. L. Englert; F/O. S. J. Gibson; P/O. W. R. Hewetson; F/O. R. B. Hutchison; Sgt. G. M. Jandron; F/O. J. G. Johnson; Sgt. J. J. B. L. Leduc; P/O. C. T. E. Lee; P/O. R. W. Link; F/O. A. C. McKenzie; P/O. V. H. McKeown; F/O. R. MacLean; Flt. Sgt. J. J. Maher; F/O. K. B. Malcolm; P/O. W. H. Martin; P/O. W. K. Maxwell; F/O. V. L. Miles; Sgt. E. Milner; Sgt. G. D. Mitchell; Sgt. M. G. Mulligan; F/O. N. K. Perry; Sgt. W. F. Reid; Sgt. W. K. Rodgers; Flt. Sgt. D. I. Rose; P/O. D. A. Rowat; Sgt. B. S. Rowe; Sgt. A. E. Sealy; F/O. T. Siltala; Flt. Sgt. R. H. Stanley; Flt. Sgt. W. C. Thom; Sgt. J. MacL. Thomlison; Sgt. A. C. Thompson; W/O. G. A. Twigge; P/O. C. Weaver, D.F.M.

KILLED ON ACTIVE SERVICE.—Sgt. W. R. Burke; L.A/C. G. Campbell; Sgt. J. S. Duguid; F/O K. R. McCormick; F/O. D. W. Probyn; F/O J. W. Wright.

DIED ON ACTIVE SERVICE.—Sgt. D. S. Sinclair

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. C. A. Farnum

SERVICE AVIATION

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. L. E. G. Bishop; F/O. W. H. Hopkins; Sgt. F. J. L. Joblin; Sgt. S. M. Tietjens; Sgt. G. W. Turnbull.

MISSING.—Flt. Sgt. L. I. Probett.

South African Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Capt. A. G. M. Budd; Capt. J. R. Lanham; Lt. J. Sadler; Flt. Sgt. C. R. Woods.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Lt. P. M. Bown; Flt. Sgt. R. K. Brown; Lt. A. C. Futter; Flt. Sgt. T. Jenkinson; Capt. D. C. Laubscher; 2/Lt. D. Q. Quilliam; Lt. D. Segal.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Lt. G. S. Hogg.

Casualty Communiqué No. 372

Of the names in this list 153 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. F. C. R. Burleinger; Sgt. J. L. Devine; Sgt. G. Gardner; Flt. Sgt. P. A. E. Grant; F/O. R. E. Stanley.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. A. Ashworth; Sgt. E. Batty; Sgt. R. Henderson; Act. Flt. Lt. D. A. Hine; P/O R. E. Mercer; F/O. H. D. Quilter; Sgt. A. H. M. Schofield; Sgt. A. E. Wilkes; Flt. Sgt. J. A. Williams.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. F. D. Ayerst; Sgt. H. Bottomley; Sgt. D. E. C. Chambers; F/O. G. B. Chippendale; F/O. F. Clough; Flt. Lt. A. C. Cochrane, D.F.C.; Act. Flt. Lt. D. O. Collinge, D.F.C.; Sgt. F. W. Davis; Sgt. S. J. Devereux; Sgt. W. J. Dewson; F/O. H. E. Dowle; Sgt. W. A. Drew; Sgt. J. L. Edwards; Sgt. W. G. Farrell; W/O. T. Fear; Sgt. J. L. Garfit; Sgt. S. F. Hammond; Sgt. B. A. Hayes; Sgt. E. Hazelden-French; P/O. J. H. Henderson; Sgt. R. Huke; Sgt. A. Hulmes; Sgt. F. J. Hunter; Sqn. Ldr. L. W. Ivey; F/O. J. D. Jeffery; Sgt. W. Jennings; P/O. S. B. Jobes; Sgt. F. S. Kennedy; Sgt. R. A. Knapman; Sgt. L. H. Lesley; Sgt D. Littlewood; Sgt. J. L. S Lowings; P/O. L. A. McCoy; F/O. R. B. Martin; Sgt. G. E. Matthews; Sgt. F. T. Morris; Sgt. W. Murray; Flt. Sgt. M. P. Noble; F/O. D. Norrington, D.F.M.; Sgt. W. Oak; F/O. R. H. Parr; Sgt. W. A. Ringe; Sgt. P. M. H. Salmond; P/O. A. F. Saunders; Sgt. G. H. Saxton; Sgt. S. Seward; Sgt. P. R. Sharman; Flt. Sgt. D. Sheldon; W/O. R. C. Sherrington, D.F.M.; F/O. R. Seer; F/O. D. L. Stevenson; Sgt. W. G. Watts; Sgt. H. F. Webster.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. H. W. Beasley.

WOUNDED OR INJURED IN ACTION.—Sgt. S. D. Baker.

MISSING, BELIEVED KILLED IN ACTION.—F/O. N. P. Blacklock; F/O. F. Cueto; F/O. H. R. Horley; Sgt. R. F. Woodiwiss.

MISSING.—F/O. M. W. Adamson; Flt. Sgt. D. Allatt; W/O. R. G. Arding; F/O. A. H. Ashford; F/O. C. G. Barnett; F/O. A. K. Barry; W/O. S. Beaton; Flt. Lt. D. A. Bell; Sgt. E. Bennett; Sgt. G. C. Borradaile; Flt. Sgt. J. T. Brown; Sgt. A. J. Cardiff; Flt. Sgt. W. H. Carr; Sgt. J. J. Cassels; Sgt. J. W. Churchman; Act. Flt. Lt. H. J. Colenutt; Flt. Sgt. P. Daley; Flt. Sgt. L. Darlington; Sgt. D. G. Davies; Sgt. F. W. C. Dean; Sgt. R. Dowzer; F/O. D. J. Duncan; Sgt. A. V. R. Edwards; W/O. M. J. Fahey; Flt. Lt. C. K. Fitzgerald; Flt. Sgt. W. C. Fulton; Sqn. Ldr. E. C. Fyson; Sgt. R. C. Gibson; Flt. Sgt. T. N. Gilchrist; Sgt. K. A. Glew; W/O. G. N. Gosling; Sgt. G. N. Hemmings; Sgt. F. R. Horner; F/O. D. J. Houston; Sgt. R. D. Howard; Flt. Sgt. C. H. Kent; Sgt. G. H. Kent; Sgt. T. R. King; Sgt C. Lidgitt; F/O. J. R. Lindley; Sgt. A. J. Long; Sgt. D. J. McLennan; Sgt. H. W. H. Marshall; Flt. Sgt. T. W. Matthews; Flt. Lt. I. S. Miller; F/O. D. H. Mills; F/O. T. Moore; Sgt. T. Newton; Sgt. C. Ostler; Sgt. W. R. Palmer; Sgt. V. T. A. Patey; Sgt. P. Pearl; Flt. Lt. D. L. Porter; P/O. H. I. Pryke; P/O. D. F. Read; Flt. Sgt. M. C. Reid; W/O. C. S. O. Relton; F/O. W. H. Rogers; Flt. Sgt. C. B. Rowlston; Flt. Sgt. S. D. Russell; F/O. G. Salter; Flt. Sgt. D. A. Slack; Sgt. G. E. Smith; Sgt. J. R. Smith; Sgt. A. Spray; Sgt. K. T. Staple; F/O. A. J. R. Thompson; Flt. Sgt. B. H. Town; Sgt. D. T. Vince; Sgt. J. W. Walker; Sgt. R. J. S. Waller; Sgt. S. J. Weir; W/O. A. Western; F/O. D. T. Williamson; Sgt. F. Wooldridge; Sgt. R. W. Young.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. N. Curry.

KILLED ON ACTIVE SERVICE.—A/C.2 A. G Donaghy; F/O. P. O. Hedges; F/O. C. Jolly; Sgt. D. Kemp; L.A/C. S. Lightfoot; Flt. Sgt. P. T. Matetich; L.A/C. E. T. Odams; Flt. Lt. J. F. Slatter; L.A/C. N. Wheatley.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. A. W. Johnson.

WOUNDED OR INJURED ON ACTIVE SERVICE.—P/O. E. Brunskill; P/O. W. S. Laker.

DIED ON ACTIVE SERVICE.—L.A/C. J. J. Addicott; Cpl. F. V. Browell; L.A/C. J. Bradley; L.A/C. F. C. Bull; A/C.2 F. H. Faulkner; A/C.2 R. H. Hall; A/C.1 P. Holden; Flt. Lt. J. H. James; L.A/C. I. Jenkins; L.A/C. W. Jones; A/C.1 H. G. Marshall; Flt. Lt. J. Murphy; Flt. Sgt. R. J. Murphy; L.A/C. E. Waite.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. G. G. Attwood; Flt. Lt. R. Beckton.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.1 D. E. Davis.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. D. H. Potter; Flt. Sgt. E. D. S. Tennant.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. R. W. Dowell; F/O. D. J. Hickey; Sgt. I. Hunter; Sgt. P. McCombie.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. S. G. Allan; Flt. Sgt. H. A. J. Cummings; Flt. Sgt. R. C. Davie; Sgt. P. J. Keay; Act. Flt. Lt. A. J. Meldrum; Flt. Sgt. O. P. Morton; Flt. Sgt. A. D. M. Ross; F/O. K. C. Wathen.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. W. J. Garretty; Flt. Lt. R. S. Holdsworth.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. G. West.

MISSING.—Flt. Sgt. E. J. Fowler; Flt. Sgt. S. G. Hill; Flt. Sgt. J. O. Lewis; W/O. C. S. Luke; P/O. G. L. Messenger; F/O. N. J. Williams; P/O. E. L. Woolcott.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. W. Lawrence; Sgt. N. T. Sparrow.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. K. M. Reid.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. W. R. Affleck; Flt. Sgt. E. L. Armstrong; F/O. A. F. Beaton; Sgt. J. A. Bessette; Flt. Sgt. N. G. Betts; Sgt. G. A. Booth; Sgt. W. Brown; F/O. G. H. Carson; Flt. Sgt. K. Clark; Flt. Sgt. W. B. F. Climie; L.A/C. A. C. J. Coates; F/O. H. V. Coulter; Flt. Sgt. J. F. K. Crowe; Sgt. A. Dixon; F/O. D. T. Dorward; Flt. Sgt. H. B. Ebbers; F/O. J. C. Elliott; Flt. Sgt. W. M. Ellis; P/O. J. W. Evans; F/O. J. A. Farnham; F/O. P. G. R. Freberg, D.F.C.; Sgt. H. G. Freeman; Sgt. H. P. Fudge; Flt. Sgt. J. R. Goodfellow; P/O. J. A. Guy; P/O. R. S. Harrison; Sgt. G. G. Hart; P/O. J. Hehir; W/O. J. W. D. Hoey; F/O. H. C. Irwin; Sgt. P. S. Johnson; Sgt. G. B. Leadbeater; W/O. W. H. Ledford, D.F.M.; F/O. H. N. Lyons; Sgt. A. F. McCoy; Flt. Sgt. G. D. McDougall; P/O. G. O. MacKay; Sgt. A. D. McKim; Sgt. C. W. McKim; Sgt. H. Macmillan; F/O. F. L. Milburn; Sgt. E. N. Moore; Sgt. W. Morey; W/O. E. A. Morgan; P/O. R. M. Murray; Sgt. D. C. Nault; Flt. Sgt. E. H. Neilson; Sgt. R. A. Newton; Flt. Sgt. E. W. O'Connell; Flt. Sgt. A. F. O'Rourke; Sgt. T. W. Peets; Flt. Sgt. W. H. Pym; Flt. Sgt. R. M. Ricketts; Sgt. F. A. Robb; F/O. E. D. Robertson; Flt. Sgt. R. A. L. Scott; Sgt. W. T. Seaman; Flt. Sgt. D. J. Shtitz; Sgt. E. C. Smith; F/O. W. F. Stewart; Sgt. E. Strandberg; F/O. I. S. Thomson; P/O. R. E. Wagner; Act. Flt. Lt. H. B. Ward; Act. Flt. Lt. W. G. Weeks; Sgt. S. Zayets.

MISSING, BELIEVED KILLED IN ACTION.—F/O. J. H. Dodge; Flt. Lt. T. R. Shaw.

MISSING.—Flt. Sgt. L. N. Botsford; Flt. Sgt. J. Donaldson; W/O. R. Corbett; Flt. Sgt. H. Ellis; F/O. D. E. Geldart; Sgt. D. L. Huband; F/O. E. E. Lynn; F/O. G. H. Mulligan; Flt. Sgt. L. H. Woodruff.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. L. A. Wearn.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. H. Bambridge.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—P/O. J. W. Hawkey.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. F. H. Hubbs; Sgt. R. M. Mingay.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. G. S. Corlett.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. T. W. Darton.

MISSING.—F/O. F. T. Culling-Mannix.

KILLED ON ACTIVE SERVICE.—Flt. Lt. A. J. Woodgate.

South African Air Force

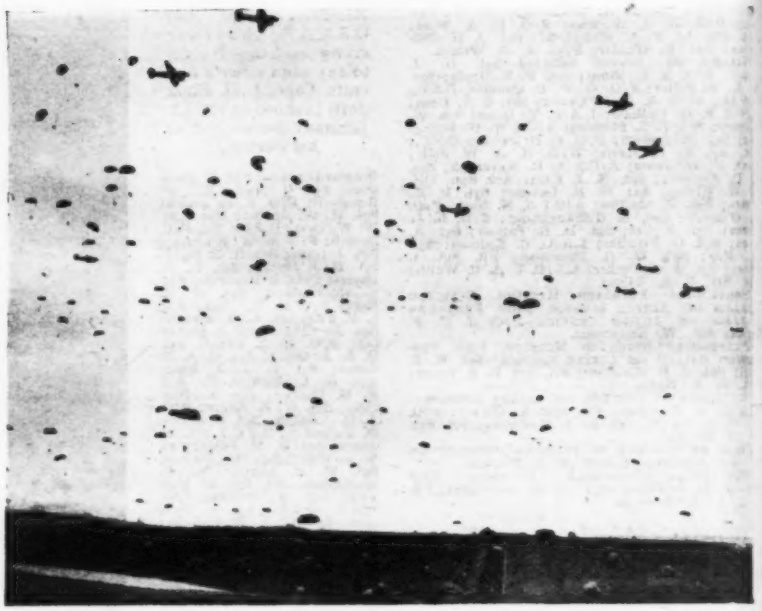
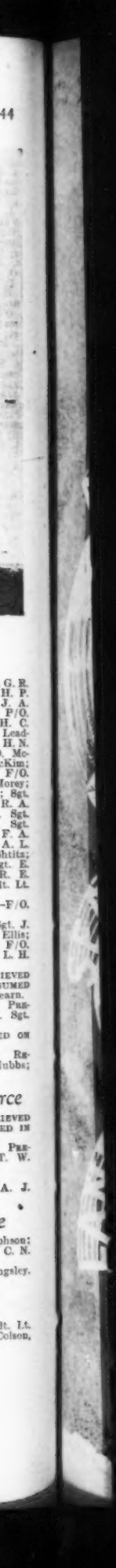
MISSING.—Lt. A. de Jong; Lt. G. Josephson; 2/Lt. M. Pines; Flt. Sgt. T. Smallwood; Lt. C. N. Vice.

DIED ON ACTIVE SERVICE.—Cpl. H. A. Kingsley.

Official Correction

Casualty Communique No. 349.

Under "KILLED IN ACTION" for Act. Flt. Lt. W. A. Colson, read Act. Flt. Lt. W. A. Colson, D.F.M.



Parachute exercise by the Ninth U.S.A.A.F. Troop Carrier Command.